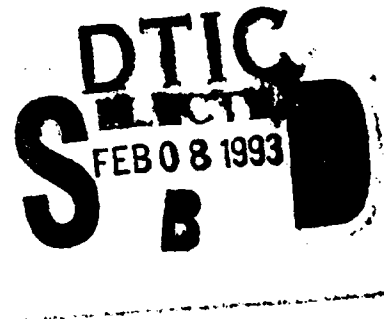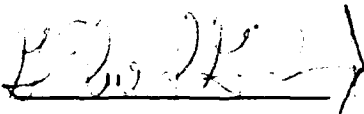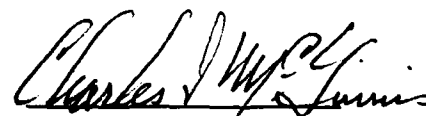# TOTAL QUALITY MANAGEMENT IN
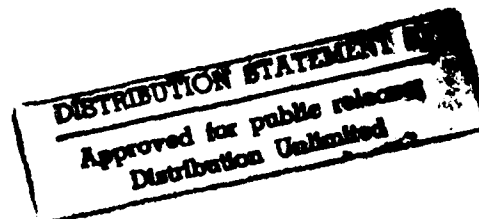
# THE UNITED STATES ARMY

# CORPS OF ENGINEERS

**APPROVED:**

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**92-32999**

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# TOTAL QUALITY MANAGEMENT IN

# THE UNITED STATES ARMY

# CORPS OF ENGINEERS

by

## MAXWELL RAY HUGHEY, B. S.

## THESIS

Presented to the Faculty of the Graduate School of

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ABSTRACT


TOTAL QUALITY MANAGEMENT IN

THE UNITED STATES ARMY

CORPS OF ENGINEERS

by

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This thesis presents an analysis of the implementation of Total Quality Management (TQM) in the U. S. Army Corps of Engineers. Total Quality Management is a management philosophy that emphasizes customer satisfaction, employee empowerment, and continuous improvement. Although TQM first gained prominence in the private sector, it is the growing public sector successes that led to its adoption by the Department of Defense. The Army Corps of Engineers has yet to formally adopt TQM. An analysis of the Army Corps of Engineers Divisions and Districts who have adopted TQM is presented in this thesis. Common success trends and pitfalls were identified among the data pool. Comparison with the implementation guidelines of the Department of Defense, Department of the Army and Chief of Engineers is presented in an overarching view of how TQM should proceed in the Army Corps of Engineers. Conclusions and recommendations are presented based on the analysis.

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# 1. INTRODUCTION

The purpose of this thesis is to analyze the implementation of Total Quality Management (TQM) in the U. S. Army Corps of Engineers. The Corps of Engineers is entering the 21st Century faced with changing mission requirements and with the certainty of personnel cutbacks. Competition for projects is increasing with private sector companies. While the situation has not deteriorated to the point that parallels can be drawn with the U.S. manufacturing sector, the Corps of Engineers faces a crossroad. Having previously relied upon a program of voluntary adoption of TQM in the Corps of Engineers, the Corps has now been directed to implement TQM as part of the new Army policy guidance. The Army, and hence the Corps of Engineers, is several steps behind the other services in terms of progress in implementation of TQM. The benefits of TQM implementation as demonstrated by the Departments of the Air Force and Navy, and to a lesser extent, the Department of the Army, are invaluable in the face of steadily decreasing Defense budgets.

The domain of this thesis is TQM implementation efforts at domestic United States Army Corps of Engineers divisions and districts. By undertaking a literature review, an evaluation of TQM implementation in Corps of Engineers divisions and districts, and a review of implementation guidance by successive organizations from the Corps of Engineers through the Federal Government, an analysis of the current status of TQM implementation in the Corps of Engineers was produced. The research methodology is outlined in detail in Chapter 2.

A history of TQM implementation guidelines from the Department of Defense; the Departments of the Army, Air Force, and Navy; and the Army Corps of Engineers is presented in Chapter 3 to illustrate the implementation efforts to date. The analysis will attempt to find common success trends and pitfalls experienced by the Corps of Engineer divisions and districts which have implemented TQM. On the basis of the analysis, a proposed implementation methodology that incorporates selected Corps of Engineers division and district TQM implementation plans as well as the current Army Corps of Engineers' draft implementation guidance is proposed.

Presentation and analysis of the research data are given in Chapter 4. On the basis of the analysis of data, a proposed implementation methodology for Corps of Engineers divisions and districts is given in Chapter 5. Finally, research conclusions and recommendations are given in Chapter 6.

# 2. RESEARCH METHODOLOGY

This chapter will discuss the methodology for conducting this research project. The research was conducted in four phases in order to ensure comprehensive coverage and the methodology is discussed below.

## 2.1 Literature Search

The author utilized several sources for background material in the literature review. Of primary importance were the Federal Quality Institute, the Departments of Defense, Army, and Navy and the Chief of Engineers' office. There are numerous references to TQM theory and implementation available and many of these were used as primary sources of information. Some of the documents used as references were not available in final form and in these cases, the author consulted with the originators of the documents to ascertain the validity of the document before referencing it in this thesis.

## 2.2 Data Gathering

A total of 11 divisions and 35 districts are headquartered in the Continental United States (CONUS). A letter was sent to the Commanders of all 46 organizations in March 1992 requesting assistance in gathering data for this thesis. Subsequently, a second letter and TQM survey were sent to the districts and divisions which indicated that a TQM program was ongoing in their organization. Finally, telephone interviews, and site visits to the Fort Worth District and

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Southwestern Division headquarters were used as additional means of gathering data. The methodology used is discussed in greater detail below.

## 2.2.1 Initial Solicitation Letter

The initial solicitation letter was intended to determine a data pool for information concerning TQM implementation in the Corps of Engineers. The letter asked for the following specific information:

1. Existence of a TQM program
2. Stage of development of the program
3. Program philosophy adopted
4. Extent of program implementation
5. Impetus to begin the program

A number of follow-up telephone calls were required to determine with certainty the status in each district and division. A copy of the letter is given in Appendix A.

## 2.2.2 Second Letter and TQM Survey

The second letter and TQM survey were sent to 14 of the 15 districts and divisions which responded that a TQM program was ongoing in their organizations. A copy of the letter and survey are included at Appendix B. A survey was not sent to the Transatlantic Division. Although the division headquarters is located in Virginia, its mission to supervise overseas construction. The results of the survey are discussed in Chapter 4.

### 2.2.3 Division and District Site Visits

The author met with the TQM coordinators for the Fort Worth District and the Southwestern Division on 18 August 1992. The purpose of the visit was to discuss the TQM survey mailed to them and to gather information concerning the missions and functions of Corps of Engineers divisions and districts. Additionally, the author asked the TQM coordinators their opinions concerning TQM implementation in the Corps of Engineers.

### 2.3 Analysis Methods

As discussed above, the first step in the analysis was to trace a chronology of TQM and its development in the Federal Government down to the Chief of Engineers' office. This was done to establish a starting point for the district and divisions in the Corps of Engineers and was primarily accomplished through a literature review and telephone interviews with individuals involved with TQM implementation. As outlined in Section 2.2 above, the next step was to survey the Corps of Engineer districts and divisions to determine the number of ongoing TQM programs. This provided quantitative data as to the number of programs and was accomplished through the initial solicitation letter. A second letter and TQM survey was sent to those districts and divisions identified as having ongoing TQM programs. The survey provided both quantitative and subjective data. The quantitative data included: when the program started; who initiated the program; who developed the program; scope of program; stage of program; and sources of assistance for the program. The subjective data included:  reasons for

implementing TQM; philosophical basis; estimates of time, money and effort expended in implementation; any barriers to implementation; the role of civilian and military personnel in the program; and status of two universally accepted steps in a TQM program (process mapping and organizational assessment).

These data were analyzed in order to develop some general trends for TQM implementation in the Corps of Engineers. The next step was to review the Corps of Engineers' draft implementation plan along with the implementation plans of several of the districts who furnished them as part of the TQM survey. The final step in the analysis was to develop a proposed TQM implementation model for a typical district/division that was based upon the following research: review of TQM literature, review of DoD and Department of the Army guidance, review of Chief of Engineers' guidance and draft plan, and survey results.

# 3. BACKGROUND

## 3.1 TQM Defined

There are many definitions for TQM. The Federal Quality Institute defines TQM as "... a strategic, integrated management system for achieving customer satisfaction" (FQI, 1990a). The Department of Defense defines TQM as: (DoD 1990a)

> Total Quality Management (TQM) is both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. TQM is the application of quantitative methods and human resources to improve the material and services supplied to an organization, all the processes within an organization, and the degree to which the needs of the customer are met, now and in the future. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach focused on continuous improvement.

Regardless of the definition or its origin, there are several recognized principles of TQM. These principles are outlined below: (Coppola 1991)

    (1) customer satisfaction

    (2) management leadership creating a quality culture

    (3) improvement of processes, not "motivation" of people

    (4) education and training (job skills and TQM tools)

    (5) defect prevention in lieu of inspection

    (6) team approach - both horizontal and vertical

    (7) continuous improvement

### 3.1.1 History of TQM

Total Quality Management (TQM) had its beginnings in the 1920's in the Bell Telephone Laboratories of American Telephone and Telegraph (AT&T). Dr. Walter Shewhart was given the problem of improving quality and uniformity for Western Electric in its production of telephones, where one of his fellow workers was Dr. W. Edwards Deming. Through statistical quality control, they were able to achieve high quality in production. The results of their work were published in 1931 in a book by Dr. Shewhart entitled Statistical Method from the Viewpoint of Quality Control. Subsequently, Dr. Deming's reputation with statistics led to his employment by the U.S. Census Bureau in 1939 to set up a statistical methodology to yield accurate census data (Aguayo 1990).

During World War II, the United States was faced with the problem of making large quantities of war supplies inexpensively and with uniform quality. The United States turned to the pioneering work of Dr. Shewhart and Dr. Deming with statistical quality control and produced the Z-1 standards for production. The British had previously adopted national standards, known as Standards 600, in 1935. After the war, when the Z-1 standards were no longer a military secret, the British adopted them as their new standards -- renaming them as Standards 1008 (Ishikawa 1985).

The Japanese were aware of both the American and British work with standards. The standards were studied by mathematicians and scholars, however they viewed them as too difficult for the manufacturing sector to employ. The beginning of statistical quality control (SQC) in Japan was in 1946. The American

occupying force used SQC in an attempt to revive the telecommunications industry in Japan to re-establish reliable communications in the devastated post-war Japan. The Japanese recognized the importance of the scientific principles and began working on the human and social differences between the two cultures. This work led to the formation of the Japanese Industrial Standards (JIS) in 1946 and the formation of the Japanese Union of Scientists and Engineers (JUSE) in 1949. The JIS was responsible for the adoption of standards in Japanese manufacturing and the JUSE was responsible for the training of scientists and engineers so they could achieve those standards (Ishikawa 1985). Each of these organizations has taken a leading role in TQM implementation and acceptance in Japan since.

In 1950, Dr. Deming visited Japan and held a seminar on SQC. The seminar was so successful that a second seminar was held for the leaders of industry in Japan. During the next few years, SQC's spread throughout Japan was met with resistance. The three complaints were: (1) the statistical methods were overemphasized and too sophisticated; (2) the prolific creation of standards and specifications were seldom used by industry; and (3) the movement remained primarily a concern of scientists and engineers (Ishikawa 1985).

In 1954, Dr. Joseph M. Juran visited Japan. It was through his reputation and convincing lectures that the Quality Control (QC) movement was generally adopted as a management tool. His work led to the dismissal of inspection as a quality check. The realization that controlling the process reduced defects and saved money for inspection was the synthesis of SQC into a management tool (Burati and Matthews 1989).

Through the mass media (publishing and broadcasting), a concerted effort to train others besides the scientists and engineers was undertaken. The result of this national effort was the birth of Quality Circles in the late 1950's. It was decided that participation in Quality Circles would be voluntary. This slowed their development, but ensured that the commitment to them was strong (Ishikawa 1985).

By 1960, the Japanese had a number of elements in place that led to a quality revolution. These elements included: scientists and engineers trained in the use of SQC; top management leaders aware of the value of SQC; a growing pool of workers trained and familiar with SQC; and an economy still suffering the effects of World War II. The Japanese knew that to accomplish the economic rebirth of their nation that they must embrace and implement QC which has subsequently led to Japan's revival as a world power.

In America, the concept of QC was still not widely viewed as a management tool. With the economies of the world reeling from the effects of World War II, the problem was not of quality, but quantity. The U.S. could sell as many goods as it could make in the world market (Burati and Matthews 1989). In the 1950's, the work of Armand Feigenbaum, a quality manager for General Electric, went unheeded when he pioneered the concept of Total Quality Control (TQC). Feigenbaum defined TQC as: (Ishikawa 1985)

> an effective system for integrating the quality development, quality maintenance, and quality improvement efforts of the various groups in an organization so as to enable production and service at the most economical levels which allow for full customer satisfaction.

In the 1960s, the U.S. embraced a variant of TQM known as the Zero Defect (ZD) Movement. This movement was widely adopted in the Department of Defense. It was a resounding failure for the following reasons: (1) it was a movement not based on the use of scientific tools; (2) it failed to realize that meeting standards is not a guarantee of excellence because standards need to be constantly amended; (3) human factors were ignored; (4) responsibility for mistakes was still placed on the workers and not management; and (5) it was a movement of will based on exhorting everyone to do their best without supplying the worker with the skill and tools to do his best (Ishikawa 1985).

During the 1970s, the U.S. market share of a number of products dropped dramatically. The reasons for the drop in market share were many and varied; but the primary reason found was the lack of quality in American goods, particularly as compared to Japan's goods. Evaluation by American industry led to the conclusion that Japan's "secret" was TQM. This led to a revival of interest by U.S. firms in the TQM "gurus" who had for forty years been trumpeting the benefits of TQM. Since then, the work of Dr. Deming has been well-documented concerning his association with companies such as Ford, IBM, Hewlett-Packard, DuPont, and Proctor & Gamble and their quality management programs (Aguayo 1990).

The three primary TQM experts in America are Drs. Deming and Juran, and Philip B. Crosby. Each has his own particular view of what TQM is and how it should be implemented. Their principles have been successfully adopted by hundreds of U.S. firms pursuing TQM. TQM, in its many forms, still retains some core principles which are important to implementing TQM.

One of the core principles is continuous improvement. Based on the initial work of Dr. Walter Shewhart and further refined by Dr. W. Edwards Deming, the PDCA Cycle is the central start point for TQM. The PDCA Cycle consists of the Plan, Do, Check, and Act steps. The first step is to plan for the change that you wish to implement. Next, you carry out the change on a small scale. The results are observed as part of the Check step. The Act step implies that you study the results and decide what you have learned. The PDCA Cycle is depicted below in Figure 1 (Deming 1986). This process is iterative in nature and leads to further improvement as the activity is refined -- hence the term continuous improvement.
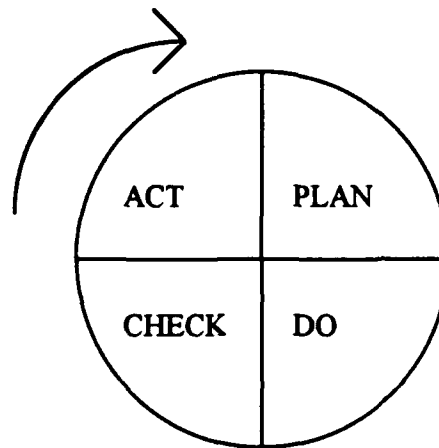


**Figure 1. Shewhart-Deming PDCA Cycle**

## 3.2 TQM in the Federal Government

The private sector's interest in TQM has led to a similar interest in the public sector, specifically the Federal Government. TQM has been seen as a means to make government function more efficiently and effectively. The beginning of

TQM efforts in the Federal Government took place in 1986, and the subsequent history is chronologically outlined below.

3.2.1 Executive Level Actions

The government-wide effort began in 1986 as a productivity improvement program under the guidance of the Office of Management and Budget (OMB). In February 1986, Presidential Executive Order 12552 established a Productivity Improvement Program for the federal government to improve efficiency, quality, and timeliness of service to the public. On 27 April 1988, Executive Order 12637 was signed. This order stressed emphasis on quality and set a target of a 3 percent annual productivity increase (Applegate et al. 1991). In August 1987, President Reagan signed Public Law 100-107, the Malcolm Baldrige National Quality Improvement Act. This act empowered the Department of Commerce with the responsibility of administering the Baldrige Award - an annual competition among private sector companies that recognizes a maximum of two winners from each of three categories (manufacturing, service, and small business). As an indication of how interest has grown in TQM, in 1990 alone, over 180,000 applications were received for the Baldrige Award. In 1987, the first annual National Conference on Federal Quality and Productivity Improvement was held. This now annual event provides a forum for the exchange of ideas related to TQM. Additionally, the winners of the Quality Improvement Prototype and President's Award for Quality are recognized. Eventually, the productivity improvement program evolved into the Total Quality Management effort in mid-1988 (FQI 1991). In October 1989,

President Bush declared that month National Quality Month (Bush 1989) thereby continuing the efforts by the executive branch begun under President Reagan.

### 3.2.2 Federal Quality Institute

The establishment of the Federal Quality Institute (FQI) in 1988 was an attempt to develop a single information source for TQM for federal agencies. The Federal Quality Institute serves three major functions: (1) provide quality awareness seminars and follow-up consultation to senior Federal managers; (2) develop and maintain a roster of qualified private-sector consultants; and (3) operate a Resource Center that would be a clearinghouse and referral source of information on TQM (FQI 1991).

Until 1989, the guidance document for TQM in the Federal Government was OMB Circular A-132. In 1990, a consolidation of OMB assets (leadership functions and resources) still devoted to TQM implementation was made with FQI. This consolidation led to the publishing of the Federal Total Quality Management Handbook (FQI 1991). As of May 1992, five pamphlets had been published. Initial publications centered on the need to inform the readership about the details of TQM and how to get started. With the publication of Education and Training for TQM in the Federal Government, FQI has moved its target to those organizations that are beginning implementation of TQM and need practical advice concerning initiation of an organization training and education program (FQI 1992a).

### 3.3 TQM in the Department of Defense

Department of Defense (DoD) involvement with quality dates back twenty years when a formal productivity improvement program was begun in the mid-1970s. The initial steps involved productivity investment funds, value engineering, efficiency reviews, quality circles and contracting out (FQI 1991). By 1987, the initial efforts of DoD had evolved into a TQM approach. These more recent TQM implementation efforts are outlined below.

### 3.3.1 Secretariat Level Actions

In 1988, the DoD strengthened its commitment to TQM through the issuance of a memorandum signed by the new Secretary of Defense, Mr. Carlucci, entitled "Department of Defense Posture on Quality." The memorandum called for "top priority to the DoD Total Quality Management (TQM) effort as the vehicle for attaining continuous quality improvement in our operations" (Carlucci 1988). In August 1988, a second memorandum issued under the authority of the Under Secretary of Defense for Acquisition directed the application of TQM to every aspect of the acquisition process (Costello 1988). In 1989, DoD issued two more memorandums aimed at TQM in the acquisition process. The first memorandum was dated 12 January 1989 and concerns "TQM in Acquisition and the Transition from Development to Production." While this memorandum is primarily concerned with the acquisition process, the memorandum does state that "TQM is applicable to all DoD activities whether concerned with acquisition or not" (Costello 1989).

The second memorandum, dated 1 May 1989, concerned "Improving the Acquisition Process -- Buying Best Value" (Atwood 1989).

No further memorandums from the secretariat level were issued. The change in Secretaries of Defense that coincided with the change of administration in Washington left further actions up to the individual service secretary initiatives (Applegate et al. 1991). The next reference to quality by any secretariat level executive was by the Secretary of Defense, Dick Cheney. During his remarks before the Quality Management Seminar for Aerospace and Defense held at Ontario, California on March 4, 1991, he does not mention TQM. He instead relates that "Quality is the key to improving the effectiveness of DoD" and that he firmly believes that "we must emphasize in every defense related activity the concept of continuous process improvement to ensure the highest possible quality" (Cheney 1991).

### 3.3.2 Department of Defense TQM Master Plan

In 1988, the Department of Defense TQM Master Plan was published. The plan outlined long-range, mid-range and short-range goals for DoD. The long-range goals (7 years) included the following: (DoD 1988)

1. Establish TQM as a way of life.
2. All DoD personnel directly doing continuous process improvement.
3. Widespread Defense industry implementation of continuous process improvement.
4. Congressional understanding of and support for TQM.

The long-term goals represent the mature application of TQM. Attainment of these goals was not expected until between 3 and 7 years after initial TQM implementation. DoD's intent was to begin TQM in the acquisition process. Success in the acquisition process was to spill over into all facets of DoD. Eventually, "TQM", as a label, would no longer be mentioned since it would be inculcated into the DoD thinking insofar as every person in DoD would practice it. The emphasis on Congressional support was consistent with the DoD view that major changes to regulatory guidance are needed to fully implement TQM.

The medium-range goals included the following:

1. Establish and implement policy deployment mechanisms.

2. Harmonize DoD Directives/Regulations/Instructions and TQM.

3. Eliminate barriers to TQM.

4. Implementation commitment by major Defense contractors, with "critical mass" achieved in at least the top 25 contractors.

5. DoD acquisition personnel use TQM principles and practices in dealing with industry.

6. Develop, produce, acquire, and promulgate a standard set of TQM training materials.

7. Establish a mature, functioning staff of facilitators.

8. Understand and coordinate with TQM efforts by other sectors of the Federal Government.

9. Develop and cultivate key congressional champions.

The attainment of mid-range goals was targeted for between 1 and 5 years after initial implementation. Again, there was increased emphasis on the acquisition process because decreasing DoD budgets make the acquisition process an easy

target for cuts and Congressional inquiry. These goals also attempted to bring all DoD efforts in line with TQM. It was not enough to rename all programs a quality program. The programs must be in consonance with the tenets of the DoD TQM program.

The short-range (1 year) goals included the following:

1. Establish Executive Steering Committee and subordinate teams, and begin training and continuous process improvement activities.

2. Identify an initial cadre of TQM facilitators and begin facilitating team activities and training staff facilitators.

3. Implement the TQM training strategy and begin collecting and developing training materials.

4. Establish an R&D program in support of TQM.

5. Develop and implement a recognition and reward system based on TQM goals and behaviors.

6. Begin ensuring consistency among TQM and major documentation and guidance.

7. Begin enlisting defense industry commitment.

The short-range goals were expected to be implemented within one year of initial TQM implementation. The short-range goals focused DoD efforts on creating a TQM philosophy that was adaptable to the military experience. Much as every other organization has had to put their own particular "spin" on the basics of TQM, it was expected that DoD would need to do the same. DoD acknowledged that TQM brings its own set of challenges to implementation in a large, public sector organization that has as a core philosophy something other than the manufacture of cars or providing quality goods and services.

The Master Plan called for three specific actions to be undertaken by the Secretary of Defense. The actions included:

1. Establish a DoD Executive Steering Committee.

2. Ongoing, regular policy deployment and process improvement efforts.

3. Services, Agencies, and OSD components to develop and submit implementation plans by 31 December 1988.

The first two specific actions agree with the accepted ways of implementing TQM in an organization. Formation of an Executive Steering Committee (ESC) and propagation of policy from the top are common actions to most TQM implementation plans (Mansir and Schacht 1989). The third action is debatable as to its effectiveness. DoD acknowledged in its Master Plan that the ESC would steer the development of TQM in DoD. Given that DoD was forming the ESC with this plan, it was highly optimistic that the ESC could form, develop broad goals for the services and guide the implementation plans of its many subordinate elements in a four month period.

With the publication of the DoD Master Plan, the DoD ESC left the individual service implementation efforts to the Service appointed TQM champions (Hopkins 1992). The detailing of their efforts is described in sections 3.3.4 and 3.4 that follow.

3.3.3 Department of Defense Total Quality Management Guide

The next step in the implementation process by the Department of Defense was the publication of a two volume guide entitled Total Quality Management Guide. Volume I dealt with key features of the DoD implementation plan. The

publication provides a general overview of TQM for top managers in DoD. Volume II was a guide to implementation for subordinate organizations. In this publication, 13 models are presented and discussed. The models fall into three general categories: (1) organizational transformation models, (2) process-improvement models, and (3) individual-improvement models (DoD 1990b). The Total Quality Management Guide was released in draft form only with a date of 15 February 1990. Both of the volumes are comprehensive in their coverage of the subject matter and favor the teachings of Dr. Deming. It appears that the logical follow-up should have been publication of the manuals in final form; however, these manuals have to date not been released in final form. The decision to not release the two volumes was jointly made by Dr. Laurie Broedling, Deputy Under Secretary of Defense for Total Quality Management, and the Service Under Secretaries because they felt that the guide would be viewed as a "cookbook" solution to TQM implementation (Hopkins 1992).

### 3.3.4 Departments of the Air Force and Navy

The Department of the Navy (DON) has aggressively pursued TQM implementation. The Navy's version of TQM is called Total Quality Leadership (TQL). It is a Deming based approach to TQM. The Navy chose Deming because (1) he emphasizes leadership responsibility; and (2) offers a systems approach to managing work and leading people (TQLeader 1992). The Navy published its strategic plan for the DON on 10 February 1992 (Garrett, et al. 1992). The document, signed by the Secretary of the Navy, Chief of Naval Operations, and the Commandant of the Marine Corps, outlines the DON's guiding principles, vision,

and strategic goals for the future. The five major strategic goals for the DON are: integration; human resources, education and training; acquisition; innovation and technology; and facilities.

The Navy's experience with TQL predates the publishing of the strategic plan by several years. In 1989, the Naval Air Systems Command (NAVAIR) was the first winner of the Presidential Award for Quality. Additionally, the Cherry Point Naval Aviation Depot (1988), the Norfolk Naval Shipyard (1989) and the Naval Publications and Forms Center (1989) are all past winners of the Quality Improvement Prototype Award given annually by the Federal Quality Institute. (FQI 1991)

Admiral Kelso, Chief of Naval Operations, has endorsed the Navy's TQL efforts. He has stated that ". . . . quality will become ever more important as our overseas force levels and budgets decline. . . . I want to start now" (Phillips 1991). The success of the Navy's shore based organizations with TQL has led to its expansion into the operating fleet. Admiral Kelso directed that eleven ships undergo TQL implementation as part of a pilot project in May 1991. The ships, six from the East coast and five from the West coast, will provide experience and models to draw from for the proposed fleet-wide implementation (TQLeader 1992).

An important resource for the Navy has been the work of the Naval Personnel Research and Development Center (NPRDC). The NPRDC developed a TQM Process Improvement Model in 1988 for the naval logistics organizations that was based on the experience of the naval aviation depots dating back to 1983. The

model is Deming-based and provides an in-depth look at the phases of the PDCA cycle as described in Section 3.1 (Dockstader and Houston, 1988).

The Navy has produced many noteworthy accomplishments as part of its TQL efforts. In the Navy Public Work Centers (PWC), analogous to Corps District offices, one of the positive outcomes of TQL has been in re-training personnel. With the implementation of TQL, a number of jobs were lost as administrative and support functions were streamlined. The displaced personnel were given temporary assignments and re-trained. Within a year, nearly all displaced workers found employment in other departments of the PWC or other line positions of the facility (FQ News 1992).

The Naval Facilities and Engineering Command (NAVFAC) studied the success of the Navy PWC's. A NAVFAC-wide top-driven TQL implementation began in 1988. Currently, all of NAVFAC's subordinate Engineering Field Divisions (EFD's) have completed the strategic planning and training required to begin initial implementation of pilot projects -- the first stage of full-scale implementation (Cox 1992).

The Department of the Air Force has met with similar success in its implementation of TQM. The Department of the Air Force promulgates its TQM guidance through the Corona Conference, a gathering of the senior Air Force leadership. The Air Force has implemented TQM in nine of fourteen commands. In three commands (Logistics, Systems, and Communications), the effort is command-wide (DoD 1991a).

The Aeronautical Systems Division (ASD), part of the Air Force Systems Command, has met with excellent success. Improvements include: significant improvements in ASD's source selection process, major reduction in change order cycle time, more timely and efficient personnel management system and dramatically improved relations with industry suppliers (Varian 1990).

The Federal Quality Institute has recognized the Air Force's TQM efforts. The Air Force Logistics Command received the Presidential Award for Quality in 1991. Also in 1991, the Quality Improvement Prototype Award was given to the Sacramento Air Logistics Center, McClellan AFB, California and the 1926th Communications-Computer Systems Group, Robins AFB, Georgia (FQI 1991).

## 3.4 Department of the Army

The Department of the Army's progress towards TQM implementation has proceeded at a lesser rate than that of the Departments of the Air Force and Navy. Regarding the Department of the Army TQM effort, Mr. William K. Takakoshi, special assistant to the Under Secretary of the Army stated that "We're still in the start-up phase at the headquarters level" (Varian 1990). While some subordinate commands, the Army Material Command (AMC), the Communications and Electronic Command (CECOM), and the Defense Contracts Management Command (DCMC), have demonstrated their commitment to TQM, the Army headquarters effort did not manifest itself until early 1992. The recent TQM history within the Department of the Army will be outlined below.

### 3.4.1 Army Regulation 5-1

The Army TQM Program was finally defined through the publication of Army Regulation 5-1 - Army Management Philosophy on 12 June 1992. This regulation establishes the Army management philosophy as "To do the right things, the right way, for the right reasons, and to constantly strive for improvement" (DA 1992a). In this document, Total Army Quality is defined as:

> A leadership philosophy and management approach. It is a leadership approach which empowers individuals to build on the aggregate capabilities of our quality Army. As a management approach, Total Army Quality focuses on continuous process improvement to meet or exceed the expectations of internal and external Army customers.

The Army management philosophy is further defined as being based on the following precepts:

    a. Top management leadership
    b. Satisfying or exceeding customer requirements
    c. Strategic planning
    d. Training
    e. Recognition and reward
    f. Empowerment, teamwork, and Total Army involvement
    g. Measurement and analysis
    h. Continuous process improvement.

### 3.4.2 Total Army Quality Concept Plan

In August 1992, the Army released the Total Army Quality Concept Plan. It was the product of a conference held at Forces Command in Atlanta, Georgia on 10-13 February, 1992. The Army is very candid about their current commitment to

Total Army Quality. At the bottom of the first page there is a sentence that reads "Adopting the philosophy and practices of Total Army Quality is not optional" (DA 1992b). The publication acknowledges that "making TAQ the 'Army Way' will take time." The Army Plan addresses the time period 1994 to 2009. The expected outcome by the year 2009 is that "TQM must become the management philosophy of every command and installation" (DA 1992b). The following discussion is based on this document.

Total Army Quality implementation is addressed as a four phase operation. The phases are viewed as sequential in nature and the rate at which implementation proceeds is left to the discretion of the commander at that level. The four phases discussed are: Awareness, Assessment, Team Building, and Action.

The Awareness phase addresses the role of the organizational leaders. The leaders must first invest the personal time and effort required on their behalf to understand TAQ. It is incumbent upon them in turn to demonstrate their commitment to their subordinates because subordinates will be influenced by their personal examples to embrace TAQ.

The Assessment phase is organized into three key areas: (1) attitudes; (2) performance; and (3) quality audit. The attitudes are surveyed through an organizational assessment that covers the values, beliefs, opinions and perceptions of the organization's personnel. The second step is to assess the objective performance of the organization. This step is similar to that of process identification or mapping. The goal is to determine costs, processes, and customer satisfaction (both internal and external). The final step is to conduct a quality audit.

The quality audit should be based on a known set of standards. Examples given are the Presidents Award for Quality criteria, Baldrige Award criteria, International Standards Organization (ISO) 9000 standards or the American National Standards Institute/American Society for Quality Control (ANSI/ASQC) Q90 standards (DA 1992b). The Federal Quality Institute presents several awards specifically targeted at Federal agencies -- the President's Award for Quality and the Quality Improvement Prototype Award. In fact, several DoD organizations have received recognition for their efforts in recent years (FQI 1991). Unless there is a movement to produce a DoD or Army award separately, the FQI administered awards will be the standard for success in DoD and the Army. The TAQ plan should heavily emphasize these awards as guides to subordinate organizations.

The third phase is Team Building. A distinction is made between large organizations and small ones. Larger organizations are directed to consider creation of a TAQ coordinator and small staff to assist the commander in implementing TAQ. Small organizations are told to avoid this as it invariably leads to the perception that TAQ is the responsibility of a TAQ coordinator and not the commander and his staff. Both organizations are counseled against the tendency to create new reports to satisfy the need to measure progress. As much as possible, existing reports should be used to track implementation and progress. A key action that must occur is the formation of three distinct groups labeled as follows: Executive Steering Committee/Council/Group (ESC or ESG); Quality Management Board (QMB); and Process Action Teams (PAT's).

The ESC generally includes the leader of the organization and his/her key subordinates. They are typically responsible for following actions:

1. Develop the organization's vision statement.

2. Direct overall TAQ improvement efforts.

3. Establish strategic goals for quality/performance improvement.

4. Provide support and resources for TAQ training, improvement projects, recognition and awards.

5. Evaluate the effectiveness, value, and priority of improvement projects.

6. Manage the improvement process and ensure efforts are aligned with the strategic goals of the organization.

7. Empower all to participate in and contribute to the organization's success.

8. Identify and remove organizational barriers to continuous improvement.

The Quality Management Board (QMB) is typically composed of top and mid-level managers. Its primary purpose is to improve communication and cooperation across both vertical and horizontal channels. At least one member of the QMB should also be a member of the ESC. The QMB is a permanent organization. Typical responsibilities include:

1. In coordination with the ESC, carry out/oversee the majority of the organization's continuous process improvement efforts in their assigned area.

2. Apply their combined knowledge to identify and select specific processes for improvement which offer the greatest potential return.

3. Approve and implement changes, within their scope of authority to improve performance.

4. Continuously monitor process performance indicators to asses the impact of changes.

5. Charter, support, and manage process action teams to accomplish specific improvement programs.

The Process Action Team (PAT) is not a permanent structure. The members are generally people who are involved in the process being studied. The PAT uses the basic statistical tools to analyze and improve work processes. Findings are reported to a QMB, ESC, or individual as specified by their instructions. The key individual in the PAT is the facilitator or team leader. Typical responsibilities for the PAT include the following:

1. Perform approved improvement projects.

2. Determine how the process is currently performed and measure the existing process capability.

3. Apply a disciplined problem solving methodology to improve process performance.

4. Present any recommendations beyond the scope of the team's authority to group (QMB or ESC) who directed the PAT project.

The final phase is the Action phase. The Action phase is the dynamic, fluid execution of TAQ in the organization. The key to this phase is continuous training that addresses the needs of the individuals in their organizational roles. The desired outcomes of this phase are listed below:

1. A competent, committed leadership team.

2. A customer focus throughout the organization.

3. A clear, meaningful, inspiring, shared vision of where the organization is going.

4. A meaningful and accurate assessment of the
   organization's strengths, opportunities for improvement,
   and cultural climate.

5. A functional, effective management infrastructure.

6. Capable, empowered, multi-disciplined process action
   teams.

A list of references is included in the publication. Of interest is the absence of any reference to previously published DoD material. Most of the references are to TQM theory books that target a "civilian" rather than military audience. Located in the plan are a number of lessons learned concerning implementation of TAQ. Most of the recommendations are standard fare found in the writings or teaching of the prominent experts. Enjoinders concerning top leadership commitment, culture changes, training problems and other similar comments are juxtaposed with comments with a decidedly military slant to them. The lessons learned include that there is no "new" money to implement TAQ; that diverting manpower to fill TQM positions is counterproductive; and that leaders must encourage frank talk from their subordinates to overcome organizational barriers and obstacles.

In mid-December 1992, the Army plans to distribute 26,000 copies of the Total Army Quality Concept Plan as part of the TAQ implementation effort in the Department of the Army. The wide-scale distribution of the TAQ Concept Plan along with an increased education effort will hopefully lead to a broadening of acceptance of TAQ in the U.S. Army (Hopkins 1992).

## 3.5  USACE Policy on TQM

The Corps of Engineers has been reluctant to direct Corps-wide TQM implementation. Its attitude towards TQM has mirrored that of the Department of the Army in that TQM was encouraged, but not directed to occur. The history of USACE implementation is outlined below.

### 3.5.1  History of USACE Actions on TQM

In 1989, the then Chief of Engineers (CoE), LTG Hatch, directed the Engineer Studies Center to study the possibility of implementing TQM in the Corps of Engineers. The Engineer Studies Center study found that the Corps of Engineers had a number of programs in place that embodied the principles of TQM and recommended that the Corps of Engineers forego any attempt to specifically direct implementation of TQM in the Corps.

In May 1990, LTG Hatch reported to the Department of the Army Director of Management that although the Corps of Engineers had not implemented TQM, its ongoing programs were realizing a significant increase in quality. Additionally, the Corps, due to constraints of time and cost, should not implement TQM at this time and potentially jeopardize the initiatives currently ongoing. A summary of the initiatives is included in Appendix D. Many of the initiatives are the same ones that districts and divisions claim as de facto proof that a "quality" program is in evidence in their organizations (Hatch 1990). Conversely, districts and divisions also claim that these same programs (especially with the frequency that they arrive) are the

reasons that they cannot take the time or effort to implement TQM (Russo 1992; Anderson 1992 and others).

The CoE issued a memorandum addressing TQM in the Corps to the Director of Army Management. Its contents were addressed above and a copy is given in Appendix C. In the letter, TQM was designated as a topic with which commanders should become familiar. The new CoE, LTG Arthur Williams, took office in August 1992. In the same month, the CoE circulated a draft implementation plan for the Corps. The decision to direct implementation was based on both the new CoE concurrence with the benefits of TQM and the recent Department of the Army position that directed implementation Army wide (Churchman 1992).

### 3.5.2  USACE Draft Implementation Plan

The draft United States Army Corps of Engineers (USACE) plan discussed above was distributed in August 1992 for comments to several USACE division commanders. Appendix E contains a copy of the draft plan. It is purposely non-specific so as to give commanders maximum flexibility in their efforts to implement TQM. It is intended to provide a general road map for implementation to those divisions and districts which have yet to implement TQM (Churchman 1992).

The USACE plan contains five phases. The phases are not to be viewed as sequential steps on the implementation path which allows several phases to be engaged at the same time.

Phase I, "Initiate the Process", seeks to accomplish two tasks. The first task is to orient the senior management to basic TQM concepts through education. The

second task is to prepare for TQM in the organization through the following actions: decide where the TQM organization fits; establish an organization vision; communicate importance of TQM to subordinates; and establish Quality Councils and Process Action Teams (PAT's).

Phase II, "Provide Training and Institute Team Building", targets the development of PAT's. The plan specifically directs formation of a cadre of instructors versed in the training of team leaders, facilitators, and statistical process control skills. The trained cadre in turn instructs the masses in the organization. Concurrent with the cadre's training of legions of facilitators, team leaders, and statistical process control experts, the PAT's are given leadership and team training to improve their ability to solve problems as a team. The final training note is to provide team building training in an office between units or between organizations.

Phase III, "Institute the TQM Process", directs leaders to have a customer focus at the center of their "TQM system." This customer focus will lead to formation of goals to meet these needs and expectations. Top leaders should encourage the TQM process growth in their organization. Top management should regularly meet with employees to discuss "ownership" accountability for achieving TQM objectives and employees' problems in implementing TQM concepts into the standard way of doing business.

Phase IV, "Conduct Periodic Reviews", stresses that existing review systems can be strengthened by integrating TQM concepts into them. Constant evaluation of systems is vital to identifying deficiencies and removing them.

Phase V, "Recognize Quality Organizations", advises organizations to establish recognition and reward programs internally and to encourage as a goal, competing for the Federal Quality Institute's Quality Improvement Prototype and President's Award for Quality.

The draft plan will be released in final form in mid-December 1992. It will encompass several minor changes to the draft plan and announce the Corps of Engineer TAQ effort as the Total Engineering Quality (TEQ) effort (Churchman 1992).

# 4. PRESENTATION AND ANALYSIS OF DATA

## 4.1 Initial Solicitation Letter

In order to determine the current implementation status of TQM in the Corps of Engineers, a letter requesting information was sent to each of the divisions and districts in the selected data group. A sample letter can be found in Appendix A. Response to the letter represented the start point for the subsequent letter and TQM survey. The results of the initial information request are also given in Appendix A.

The respondents were asked to describe their TQM efforts and the responses fell into three categories: none, formal, and informal. None described no TQM effort at the present time. Formal described an ongoing TQM implementation plan. The respondents used "informal" to describe what they felt was an ongoing quality plan that possessed many of the same qualities found in a formal TQM effort. A summary of the information request results are included at Table 1 below.

**TABLE 1.** Responses to Initial Letter Concerning Status of TQM in Corps of Engineer Organizations

|  | TQM PROGRAM  N = 46 | | |
|---|---|---|---|
|  | NONE | FORMAL | INFORMAL |
| DIVISIONS | 8 | 2 | 1 |
| DISTRICTS | 17 | 13 | 5 |
| TOTAL | 25 | 15 | 6 |

The responses were grouped by division and district and by the type of TQM plan in place. There were eleven respondents in the divisional grouping. Of the eleven respondents, 8 reported no plan, 2 reported a formal plan, and 1 reported an informal plan. Some of the reluctance to implement TQM by divisions can possibly be traced to the uncertain status of divisions in the Corps of Engineers future. In 1991, an initial Corps re-organization plan was proposed by LTG Hatch. In it, the Corps was to reduce the number of divisions from ten to six. The decision to implement the plan was delayed until July 1992 (Hatch 1991). In November 1992, the Corps proposed a new re-organization plan that eliminated five division locations -- New York, San Francisco, Omaha, Dallas, and Chicago (Churchman 1992). Regardless of decisions concerning closure of division headquarters, the number of divisions currently formally implementing TQM is only 18%. This is indicative of the acceptance of TQM in the Corps of Engineers. Figure 2 below depicts the responses graphically. The responses by percentage are shown above the bars in the chart.

There were 35 districts that responded to the letter. Of the 35 districts, 17 reported no plan, 13 reported a formal plan, and 5 reported an informal plan. The percentage of districts with formal TQM implementation plans is only 37%, which is similar to the low percentages found in the divisions. This low percentage demonstrates the early implementation status of TQM in the Corps of Engineers. The results are shown in Figure 3 with the responses by percentage of the total shown above each.
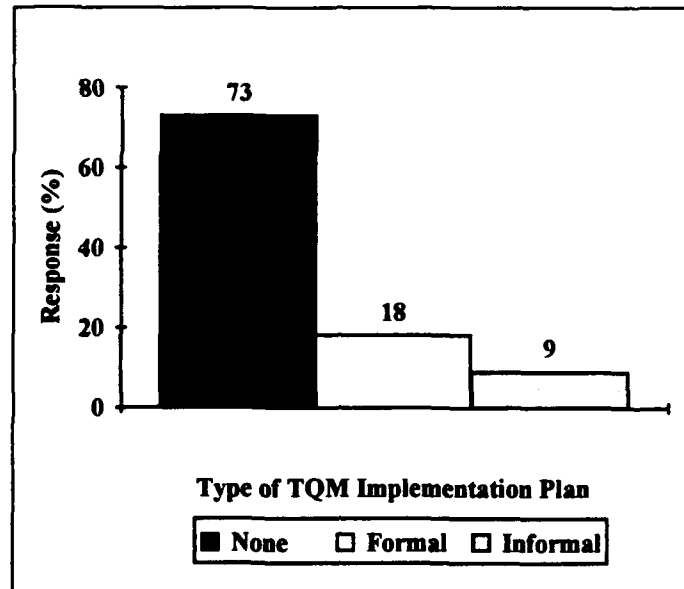
**Figure 2. Type of TQM Plan in Place by Division**
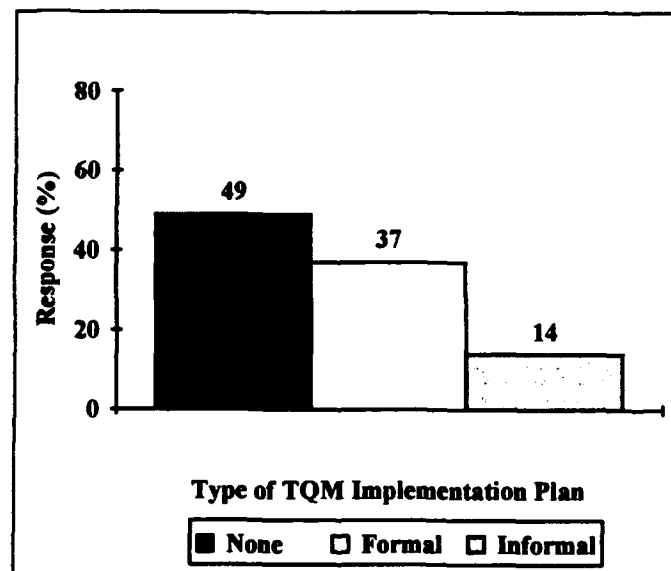


**Figure 3. Type of TQM Plan in Place by District**

## 4.2 Results of the TQM Survey

A Total Quality Management (TQM) Survey was mailed to each of the districts/divisions that indicated they had an ongoing TQM implementation effort. The survey consisted of 14 questions that were either multiple choice or short answer in nature. A copy of the survey can be seen in Appendix B. The survey's intent was to determine the initial reasons for embracing TQM, to benchmark the status of TQM, and to identify barriers encountered.

The survey's fourteen questions consisted of four questions concerning initial reasons for implementation, seven questions concerning benchmarking, and three concerning barriers. In order to contrast differences, the respondents were broken down into three groups relating to their stage of TQM implementation. Stage I is characterized by initial planning and training, by formation of steering committees, and by conducting an organizational assessment. Stage II is characterized by formation of quality councils, beginning employee training and selection of pilot projects. Stage III is full implementation of TQM. None of the respondents characterized their organizations as currently in Stage III.

Note that the Transatlantic Division was not sent a TQM survey. Although its division headquarters in located is the United States, the division's function is to provide construction services to overseas locations.

To facilitate follow-up and any needed telephone interviews, the survey recipients were restricted to wholly continental U.S. based organizations. There were 12 respondents to the survey out of the 14 mailed. Two districts did not respond to the survey -- one did not because the TQM coordinator was sent to

south Florida as part of the Corps' effort on behalf of Hurricane Andrew clean-up and the other district TQM coordinator was involved in a succession of schools and other matters that precluded him from responding to the survey.

Although it was presented as Question Five in the TQM survey, it will be used to begin the analysis of the TQM surveys. Question Five concerned the perceived stage of development of TQM in the respondent's organization and is given below. The current status of respondents by Stage is indicated in Table 2. Again, note that none of the respondents considered themselves to be mature in TQM implementation. This result is consistent with the Deming's view that TQM takes 3-5 years to implement (Deming 1986).

> *5) What is the current Stage of TQM implementation in your organization? (Please circle only one)*
>
> *a) Stage I - characterized by initial planning and training, organizational assessment ongoing, steering committee forming*
>
> *b) Stage II - characterized by formation of quality councils, employee training begun, pilot projects selected*
>
> *c) Stage III - full implementation*
> *Describe what you have done to date as far as TQM actions.*

**TABLE 2.  Assessment  of TQM Development Stage in Organization**

| Stage I | Stage II |
| --- | --- |
| Galveston District | Albuquerque District |
| Little Rock District | Fort Worth District |
| Louisville District | Portland District |
| Mobile District | Savannah District |
| Seattle District | Southwestern Division (Dallas) |
| St. Louis District | Wilmington District |

4.2.1  Initial Reasons for TQM Implementation

The first four questions of the survey concerned initial reasons for implementing TQM.  No particular order was given to the questions.  Question One is shown below.

*1) What was the major impetus behind your decision to*
*implement TQM?*
*a) internally driven - District Cdr, TQM champion or*
*other*
*b) externally driven - higher HQ's (Division or COE)*
*Please comment on which was the principal factor.*

The results are summarized below.

**TABLE 3.  Impetus to Implement TQM**

| N = 12 | Stage 1 | Stage 2 |
| --- | --- | --- |
| Internally Driven | 2 | 6 |
| Externally Driven | 4 | 0 |
| Overall | 6 | 6 |

The respondents in Stage 2 all cited their source for implementation as internally driven. The respondents in Stage 1 cited internally driven in only 2 out of

the 6 responses. This difference appears consistent with the more advanced Stage of the program development in the Stage 2 respondents. TQM can be decreed by a higher authority, but the embracement of it as a philosophy has to be internalized (Berry 1991).

The second question is shown below.

> *2) List some of the contributing factors that caused your organization to consider TQM. Examples would be: change in COE mission, customer input, anticipation of downsizing in the COE, and exposure to TQM in conferences and seminars.*

Typical reasons were given as examples. The respondents were asked to list all contributing factors. These responses were grouped and are shown below in Table 4. Note that some of the respondents cited several factors.

**TABLE 4. Contributing Factors for TQM Implementation**

| Frequency | Contributing Factors                          N = 32 |
|-----------|-------------------------------------------------------|
| 8         | Exposure to TQM via seminars and literature           |
| 4         | Need to improve customer care and quality             |
| 4         | Recognize need for change                             |
| 4         | Potential COE mission changes                         |
| 3         | Cost of doing business                                |
| 3         | External directive                                    |
| 3         | Increased competition from other agencies             |
| 2         | Discussions with other organizations                  |
| 1         | Customer input                                        |

The responses can be classified as either proactive or reactive. Proactive responses indicate that the organization is attempting to improve or better itself

before the onset of a crisis. Reactive responses are actions or decisions made for the organization and dictated either by its higher headquarters or the organizations present conditions. Examples of proactive reasons include: recognition of a need to change, desire to increase customer care and quality, competition from other Federal agencies, and recognition of potential COE mission changes. Examples of reactive reasons include: responding to external directives, customer input, and the cost of doing business. Figure 4 below indicates the responses by reason (proactive or reactive) and the response group (Stage I or Stage II).
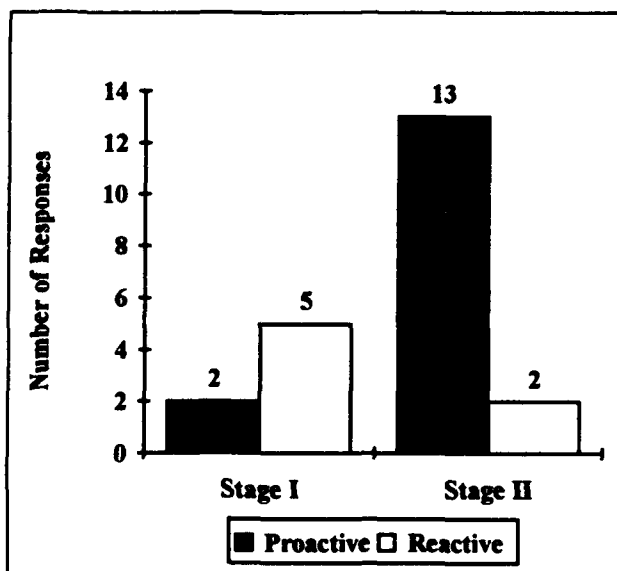


**Figure 4. Contributing Factors to TQM Implementation**

Stage 1 organizations were more likely to choose reactive reasons (71%) rather than proactive reasons (29%). Stage 2 organizations were more likely to choose a proactive reason (87%) rather than reactive reasons (13%). Two reasons were deemed by the author to be neither proactive nor reactive. Those reasons

were "exposure to TQM through seminars and lectures" and "discussions with other organizations" and these reasons were excluded from the Figure 4 data which accounts for the smaller number of data points (22 total). The differences between the two stages are apparent in the progress made in implementing their respective TQM programs. The higher percentage of proactive reasons chosen by the Stage II organizations indicates a firmer commitment to TQM than those of the Stage I organizations who chose to implement TQM based primarily on reactive reasons.

The Third question concerned the TQM resources used during implementation and is shown below.

> 3) *What sources of assistance with TQM have you used in*
> *your TQM program? (Circle all that apply)*
>> a) *Academic environment (University or college)*
>> b) *TQM consulting firm*
>> c) *Literature*
>> d) *Federal Quality Institute*
>> e) *Seminars*
>> f) *Other DOD organizations (Navy or Air Force)*
>> g) *Other districts/divisions*
> *Comment on which of these sources are most valuable to*
> *you.*

A summary of the responses is included at Table 4. Neither Stage grouping showed any trends or tendencies that would differentiate the two groups. Trends did develop for the Stage as a whole. All the respondents listed literature as a source of assistance. Again, most of the respondents listed a TQM consulting firm, seminars or the Federal Quality Institute as a primary source of information or assistance. Academic environments, other districts/divisions, and other DoD

organizations can be viewed as situationally dependent in their assistance. Proximity to these sources dictates whether they are used in that respondents who had access to local university classes or who had other DoD organizations (Navy or Air Force) nearby reported their use.

**TABLE 5. Sources of Assistance Used in TQM Implementation Efforts**

| Source of Assistance | Stage 1 | Stage 2 | Overall |
|---|---|---|---|
| Literature | 6 | 6 | 12 |
| Seminars | 5 | 4 | 9 |
| TQM consulting firm | 4 | 5 | 9 |
| Federal Quality Institute | 4 | 4 | 8 |
| Other DoD organizations | 3 | 3 | 6 |
| Other districts/divisions | 3 | 3 | 6 |
| Academic environment | 2 | 3 | 5 |

The respondents were also asked to list the sources they felt were most valuable to them in implementing TQM. The number of responses (twenty) indicates that some organizations felt that more than one source was of primary importance to them. Figure 5 summarizes the twenty responses given. Clearly, other organizations and consultants were viewed as the most valuable sources of assistance. The respondents cited two reasons for their choices: (1) experience with TQM increased the credibility of consultants; and (2) feeling that other military organizations could better relate to their situation. Note that "other organizations" includes other divisions/districts and other DoD organizations.
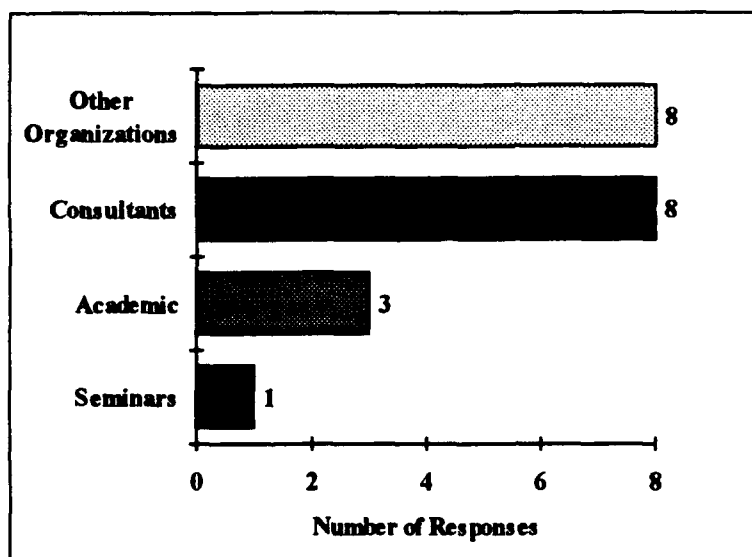
**Figure 5. Primary Sources of Assistance with TQM Implementation**

The Fourth question concerned whether a single TQM expert or philosophy was adopted or a mix of styles was chosen and is given below.

*4) When your organization initially adopted TQM, was the*
*original intent to use:*
   *a) one single TQM "guru" or philosophy*
   *b) a mix of styles*
*Comment on what philosophy has now evolved.*

Every respondent answered that a mix of styles was the best choice and was what they had adopted to date. These comments fit the general rule for TQM in that you should seek exposure to many sources before deciding upon a philosophical style (Barrier 1992). All the prominent TQM experts were cited (Deming, Juran, and Crosby) as contributing to the philosophies adopted. Additional sources were also frequently cited as being part of the philosophical mix. No one TQM expert was cited with any more frequency than the others. The

majority of responses indicated that a general philosophical style was sought from the outset. One interesting observation was the concern over the need to standardize the terms throughout the Corps (Anderson 1992). With no current standardization of terms, the Corps' ability to exchange ideas and results is hampered. With the limited TQM implementation to date, non-standardization is not perceived as a problem. When full-scale implementation in the Corps is mandated, the non-standardization could potentially be disruptful.

### 4.2.2 Benchmarking TQM in the Organizations

Questions' Five through Eleven dealt with benchmarking the status of TQM in the organization. Questions' Five through Nine were answered by all the respondents, while Questions' Ten and Eleven were probably not appropriate at this time for all the respondents because they were directed to a more mature TQM program than most respondents had achieved. Question Five has been addressed earlier and was used as the basis for segregating the respondents.

Question Six dealt with when the TQM program was begun in the organization.

> *6) When did the TQM program begin in your organization? How long was the exploration Stage? (The exploration Stage is defined as the time spent deciding whether to implement TQM). If the exploration Stage was long, comment on what were the factors involved. Examples would be: reluctance by senior personnel, resource constraints, other priorities, or difficulty in obtaining sufficient information.*

The Stage 1 respondents had difficulty in pointing to a specific start date. This is understandable in an organization that is still in the exploration phase. While many of them had specific examples of actions accomplished, they were not wholly committed to TQM at this time. Stage 2 respondents were much more definite in their responses. All of their programs had formal start dates. The Stage II responses (6 total) are included at Table 6 below. The major differences between respondents were in the duration of the exploration phase which ranged from several months to one year. The average length of duration was nine months. Two of the respondents cited resource constraints (financial) as a contributing factor to the length of their exploration phases. Note that no TQM implementation effort has been in place more than 33 months.

**TABLE 6. Summary of Stage II Respondents Concerning TQM Start Date and Length of Exploration Phase**

| Duration of Exploration | Start Date |
|---|---|
| 5 months | February 1990 |
| 12 months | February 1990 |
| 12 months | February 1990 |
| 12 months | August 1990 |
| 9 months | June 1991 |
| 4 months | December 1991 |

Question Seven concerned the targeted TQM efforts versus the actual TQM effort that evolved and is given below.

7)  This question attempts to differentiate between initial
planning and actual implementation of TQM?
>    A)  What areas did you initially target TQM efforts?
>    a)  Admin areas only        c)  Engineering services only
>    b)  Construction only       d)  District/Division wide
>    B)  What areas did you actually implement TQM?
>    a)  Admin areas only        c)  Engineering services only
>    b)  Construction only       d)  District/Division wide

Note that this question gave the respondents a choice between limited scope implementation or an organization-wide choice. A summary of the responses is included at Table 7 below.

**TABLE 7.  Planned versus Actual TQM Implementation Plans**

| N = 12 Functional Area | Stage 1 Planned/Actual | Stage 2 Planned/Actual | Overall Planned/Actual |
|---|---|---|---|
| Administrative areas only | 1 / 0 | 1 / 0 | 2 / 0 |
| Construction only | 0 / 0 | 0 / 0 | 0 / 0 |
| Engineering services only | 0 / 0 | 2 / 2 | 2 / 2 |
| District/Division wide | 5 / 0 | 4 / 4 | 9 / 4 |

**Note**:  One Stage II respondent gave two planned and one actual response.

It is noteworthy that 5 of 6 of the Stage 1 respondents had their target as an organization-wide TQM effort. The lone dissenter was the Seattle district which closely followed the Portland TQM program successes (Elliot 1992). Its initial efforts were targeted at the administrative (financial) areas of the organization. The Stage 2 respondents had a mixed response. Four of six targeted and achieved a district wide approach to TQM. The remaining two focused their efforts on the engineer services aspects of their organizations with the intent to expand the effort

organization-wide later. All the Stage 2 respondents reported no setbacks in achieving these goals. It would seemingly be in the best interests of the Stage 1 respondents to review the decision-making processes that the Stage 2 respondents took to determine the extent of the targeted goals. A limited scope approach could be useful in overcoming some of the barriers that will be highlighted later by the responses to Question Twelve.

Question Eight concerned the difference between the initial projections and the actual expenditures, in terms of time, money, and effort, associated with TQM implementation by organization. The responses to this question are presented in Table 8.

*8) Knowing that it is difficult to capture the cost of TQM implementation, check the box in the table below that best satisfies your opinion of what the cost has been to date for your organization — based on your initial projection.*

|  | Initial Projections | | |
|---|---|---|---|
|  | *Money* | *Time* | *Effort* |
| *Less Than Expectations* |  |  |  |
| *Meet Expectations* |  |  |  |
| *Exceed Expectations* |  |  |  |
| *Greatly Exceed Expectations* |  |  |  |

**TABLE 8.  Estimation of Resource Expenditures in Terms of Money, Time, and Effort**

| N = 5 | Stage 1 Respondents | | |
|---|---|---|---|
| | Money | Time | Effort |
| Less Than Expectations | 2 | 1 | 1 |
| Meet Expectations | 2 | 2 | 2 |
| Exceed Expectations | 1 | 1 | 2 |
| Greatly Exceed Expectations | 0 | 1 | 0 |

| N = 6 | Stage 2 Respondents | | |
|---|---|---|---|
| | Money | Time | Effort |
| Less Than Expectations | 1 | 1 | 0 |
| Meet Expectations | 3 | 3 | 1 |
| Exceed Expectations | 2 | 2 | 5 |
| Greatly Exceed Expectations | 0 | 0 | 0 |

One of the Stage I respondents did not answer the question because it was too early in the implementation process to gauge the efforts to date. Several observations are apparent when looking at the responses. First, the respondents with more advanced TQM programs (Stage 2) are more likely to report greater than expected expenditures in all three categories -- especially for effort required. Second, those respondents reporting that their program is primarily an in-house product report lower money costs than those who primarily relied on a joint effort of in-house and consultants. This outcome is understandable. Finally, it is likely that the Stage 1 respondents will revise their responses upward for expenditures as their TQM programs mature.

Question Nine asked the respondents to characterize their TQM programs as an in-house product, a facilitator driven product, or a mix of the two.

> 9) How would you characterize your current TQM effort?
> a) In-house product
> b) Joint effort of in-house personnel and an outside facilitator
> c) Entirely driven by outside facilitator

Both stages reported the same results (4 of 6 as in-house products). Responses are summarized in Table 9 below.

**TABLE 9. Primary Responsibility for Current TQM Implementation Plan**

| N = 12 | Stage 1 | Stage 2 | Overall |
|---|---|---|---|
| In-house product | 4 | 4 | 8 |
| Joint effort of in-house personnel and an outside facilitator | 2 | 2 | 4 |
| Entirely driven by outside facilitator | 0 | 0 | 0 |

Question Ten concerned whether process mapping or identification had occurred.

> 10) One generally recognized step during Stage one of TQM implementation is process identification or mapping. If your organization has performed this, comment on your findings in terms of benefits of the exercise, perceived vs actual performance levels found, and differences between policy and practice.

Eight of the twelve respondents reported that these methods had not been attempted to date. The other four reported limited success or that the process is ongoing. Two of the process mapping efforts concerned financial management.

One respondent began with the design-construction process. One respondent began an organization-wide process mapping effort.

Question Eleven concerned whether an organizational assessment had been performed.

> *11) Another typical TQM implementation step is to perform an organizational assessment. What performance measurements are you using for your organizational assessment? Additionally, are the measurements internally derived or are they externally obtained? Examples of external sources are: customers, COE, construction industry, etc.*

Responses were similar to question ten. Eight had not performed this action to date. One was ongoing. Three had completed their organizational assessment. Of the three completed, all had chosen different paths to accomplish the task. One used a standard DoD measurement survey (DoD 1991b and 1991c), another used a consultant's survey, and the third used an in-house generated survey.

## 4.2.3 Barriers to Implementation

Questions' Twelve through Fourteen concerned barriers to implementation. Identification of barriers is important regarding the larger problem of Corps-wide TQM implementation. Knowing of potential barriers does not prevent their occurrence; but, it can assist other organizations in overcoming them.

Question Twelve asked specifically for barriers encountered.

> *12)     List any barriers you have encountered in implementing TQM. If you have yet to encounter any, list those that you anticipate.*

The results are tabulated and sorted in descending order at Table 10. The differences between the Stage I and Stage II groups appear significant.

**TABLE 10. Barriers to TQM Implementation Listed by Frequency of Response**

| Stage 1 | Stage 2 | Overall | Response            N = 24 |
|---------|---------|---------|----------------------------|
| 1 | 4 | 5 | Lack of commitment by senior personnel |
| 3 | 1 | 4 | Viewed as another program or fad |
| 1 | 2 | 3 | Loss of power by senior personnel |
| 2 | 0 | 2 | Confusion or fear as to changes |
| 2 | 0 | 2 | Problems getting started |
| 0 | 2 | 2 | TQM is hard work |
| 1 | 0 | 1 | Not a priority |
| 1 | 0 | 1 | Commitment by higher headquarters |
| 0 | 1 | 1 | Impatience by higher headquarters |
| 0 | 1 | 1 | Lack of employee commitment |
| 0 | 1 | 1 | Potential Corps re-organization |
| 0 | 1 | 1 | Resource constraints |

Stage 1 respondents reported the following as the primary barriers: (1) viewed as another program or fad; (2) confusion or fear concerning changes; and (3) problems getting started. Stage 2 respondents reported the following reasons: (1) lack of commitment by senior personnel; (2) threat of loss of power by senior personnel; and (3) TQM is hard work. Stage 1 responses are typical for an organization that is beginning any new program. Stage 2 responses demonstrate that senior personnel may lack commitment to embrace TQM and when faced with the reality of the effort (i.e., TQM is hard work), may pull back from the commitment. This occurrence is listed by Deming as one of his Seven Deadly

Diseases -- Lack of Constancy of Purpose. The failure of senior leadership to maintain their commitment will result in failure of TQM implementation (Deming 1986).

Question Thirteen concerned the role or civilians versus military in the organization.

> *13) Comment on the role of civilian vs military personnel*
> *in the TQM process. Is a conscious decision being made to*
> *differentiate between what TQM roles they will fill?*

The responses were grouped by similarity and are summarized at Table 11 below.

**TABLE 11. Comments on the Military and Civilian Roles in TQM Implementation**

| Frequency | Response          N = 15 |
|-----------|--------------------------|
| 5 | TQM program needs to be in long-term care of civilians |
| 4 | Commander needs to show involvement in TQM program |
| 3 | Continuity loss with frequent change in military commanders |
| 3 | No conscious effort to differentiate civilian and military roles |

The numbers of responses indicate that some organizations commented on more than one aspect of the military versus civilian role. The two positive responses to note are that civilian managers should be the long-term caretakers of the program and that the military commander should take an active role in support of the program. The negative comments were reflected in Stage 1 responses. Three of the Stage 1 respondents expressed concern that the program would lose continuity when the current military commander left.

In the Leadership for TAQ Concept Plan, the Army seems to accept the idea of civilian manager care of TQM in the organization with the following statement (DA 1992b).

> We must work to establish adaptive management systems and business and work processes which endure and transcend the tenures of individual commanders.

In conclusion of the same document, the Army makes it abundantly clear as to the role of the commander and his responsibilities in the organization (DA 1992b).

> TAQ may change the roles of leaders/managers, but it does not replace leadership not command authority. It provides leadership and commanders with the tools to enhance individual and organizational performance. Commanders at higher organizational levels are still responsible for subordinate units. Commanders and heads of activities are responsible and accountable for both the results and the process used to achieve them.

This statement by the Army is at odds with the respondents view that the military commander should support TQM in the organization. The role of the military commander is to be the TQM champion for the organization. Koaru Ishikawa, the foremost Japanese TQM expert, had this to say about the TQM (Ishikawa 1985).

> Unless the person in charge, the one who has full power, that is the president or the chairman, takes the initiative and assumes leadership in implementing quality control, the program cannot succeed.

His views on TQM are seconded by the William K. Takakoshi, Special

Assistant to the Undersecretary of the Army, who had the following to say about

the role of commanders and TQM (Varian 1990).

> I am a realist,' says Mr. Takakoshi. 'And in the Army, the
> reality is that the commanders are the key. We have to reach
> our commanders, convince and help them to become total
> quality champions, and persuade them to put their brightest
> people on the task of implementing TQM.'

Question Fourteen concerned the current programs in the organization that

embodied some of the precepts of TQM. Appendix D contains a summary of

Corps of Engineer initiatives begun in the last decade and an explanation of their

purpose. The summary of responses is included at Table 12.

> *14) Comment on existing programs in your organization
> that you feel embody some of the precepts of TQM.
> Examples are: partnering, simultaneous engineering, and
> alternative dispute resolution.*

**TABLE 12. Quality Initiatives Ongoing in Respondent Organizations**

| Frequency | Response         N = 25 |
|---|---|
| 8 | Partnering |
| 4 | Army Ideas for Excellence Program |
| 3 | Alternate Dispute Resolution |
| 3 | Customer Care Initiatives |
| 2 | Team building |
| 2 | Program and Project Management |
| 2 | Value Engineering |
| 1 | Army Community of Excellence Program |

The numbers of responses (25 total) reflect that some organizations have more than one of the programs ongoing in their organization. The primary concern of organizations that have implemented TQM is that other districts/divisions will feel that the programs listed give evidence of a de facto TQM program. Their experience has been that these programs need the overarching thread of TQM to achieve continuous improvement in the organization. (Johnson 1992b and Anderson 1992).

## 4.3 Organization Site Visits

On 18 August 1992, the author visited the Fort Worth District and the Southwestern Division (Dallas) to conduct interviews with the organization's TQM coordinators. The primary of purpose of the visit was to obtain comments on the TQM survey and to discuss the mission and functions of both division and district organizations. The comments are attributable to Ray Russo, Southwestern Division TQM Coordinator, and Roger Anderson, Fort Worth District TQM Coordinator.

The TQM survey was discussed in great length. Both of the TQM coordinators felt that Questions' Ten and Eleven discussed actions that would likely occur in mature TQM organizations. Their observations proved cogent based on the number of respondents (67%) who indicated that these actions had yet to occur in their organizations. Both felt that the number of Corps of Engineers quality initiatives, and the emphasis placed on them, had slowed the pace of TQM implementation in the Corps of Engineers. Finally, both felt that the complexity of

their organizations would contribute to the difficulty of implementing TQM on an organization-wide basis.

The roles and functions of both a division and district were discussed with the TQM coordinators. A copy of organizational charts and the internal operating procedures was obtained. The problem of downsizing in the Corps and the changing of the Corps mission surfaced as concerns. The Southwestern Division targeted for closure in July 1991 was, at the time of the interview, waiting to hear the 1992 announcement concerning the Corps Re-Organization Plan. Both men expressed a concern for the future of the Corps mission because of increasing private sector competition, a decreasing number of new projects in district boundaries, and a growing need to diversify Corps expertise into new areas.

# 5. PROPOSED TQM IMPLEMENTATION MODEL

This chapter will present a proposed TQM implementation methodology for Corps of Engineer divisions and districts. The overall model is based on research done by the Total Quality Management Task Force for the Construction Industry Institute (CII) (CII 1992). Current DoD and USACE implementation plans, as well as the survey results, were also synthesized into developing this plan.

## 5.1 Basis for Model

The basis for the model was a Construction Industry Institute (CII) research product from the TQM Task Force. It is an excellent product in that it gives a comprehensive model of the TQM journey in four Phases. The four Phases are: (1) Exploration and Commitment, (2) Planning and Preparation, (3) Implementation, and (4) Sustainment (CII 1992). The purpose of this proposed model given here is to provide a product for those Corps of Engineer divisions and districts which have not implemented TQM and need a starting point. The basic model is supplemented with information from a variety of other sources. Some of the primary sources of information are the individual district implementation plans received by the author in response to the TQM surveys mailed to districts and divisions, as well as survey responses.

The model was adapted to the PDCA Cycle (as explained in Section 3.1) and is shown below in Figure 6. Phase I concerns the decision whether to adopt TQM and is considered as part of the PDCA Cycle Plan Step. In Phase II, the planning and preparation for TQM implementation occurs -- which is the

conclusion of the Plan Step in Phase I. The next step in the PDCA Cycle is the Do Step. Phase III in the model is the Do Step for TQM implementation. In Phase III, TQM begins in the organization. The next steps in the PDCA Cycle are the Check and Act Steps. Phase IV (Sustainment) encompasses both of these steps. The Sustainment Phase consists of actions that look backward (Check Step) such as QC audits and re-training of personnel as well as actions that look forward (Act Step) such as strategic planning, new policy deployment and creation of new teams. Each of these phases will be detailed in subsequent subchapters.
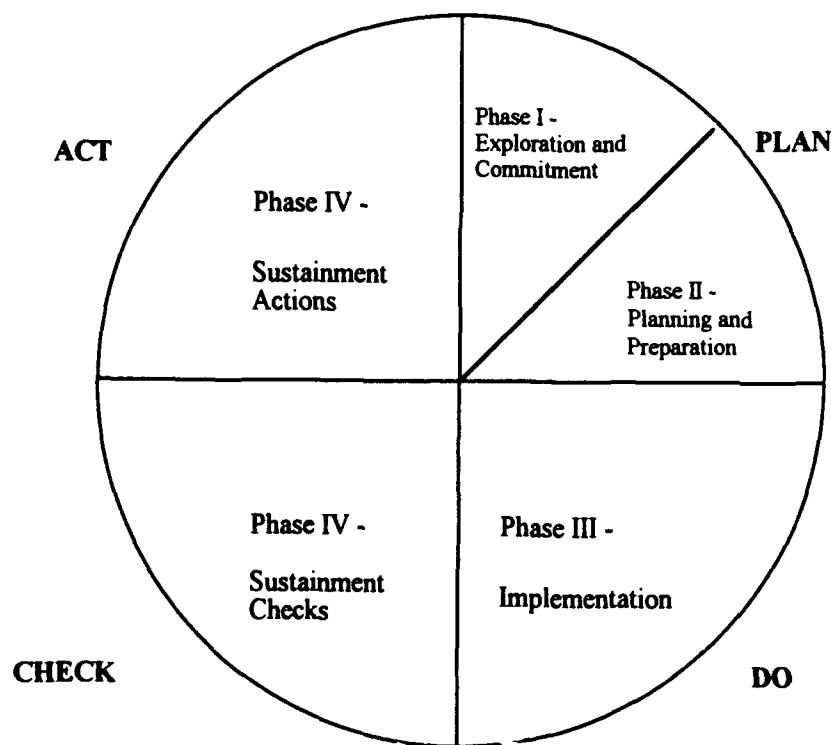


**Figure 6. PDCA Cycle for TQM Implementation**

## 5.2 Phase I - Exploration and Commitment

The Exploration and Commitment Phase is the decision period during which the organization's senior leadership decides whether to implement TQM. In the PDCA Cycle Model, this Phase is considered the first part of the Plan Step. There are a number of steps that must be taken and several actions that must occur before moving to Phase II. These actions are the specific responsibility of the district's senior leadership and cannot be delegated. A model for the steps in Phase I is given in Figure 7 below and is discussed in detail in Section 5.2.1.
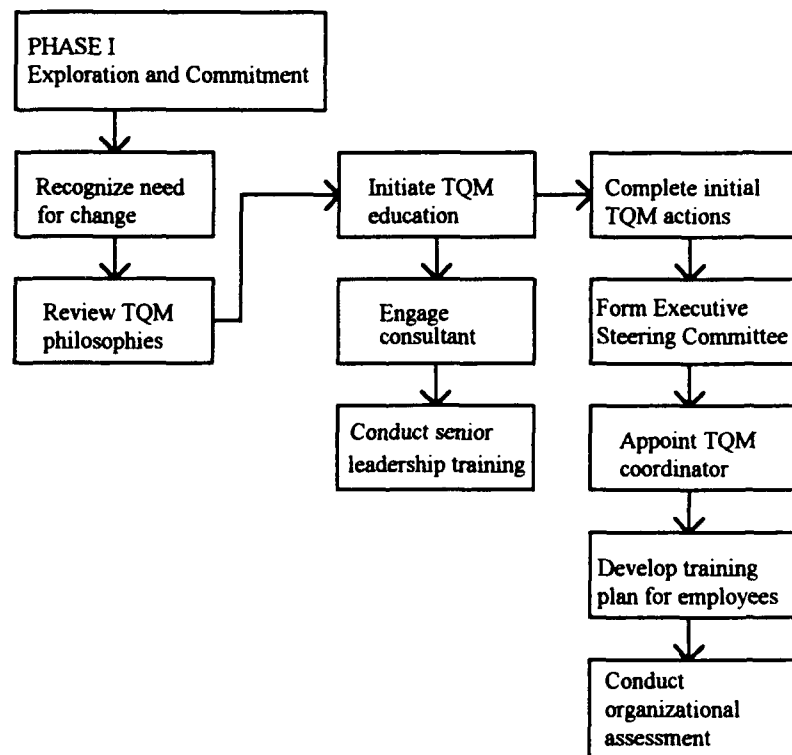


**Figure 7. Model for Phase I Steps**

### 5.2.1 Discussion of Phase I Steps

The first step is to recognize a need for change in the organization. In the TQM survey, as outlined in Chapter 4, the recognition of a need for change included: desire to increase customer care and quality; changes in the Corps of Engineers mission; and anticipating the downsizing of Corps of Engineers. The impetus for change has been directed by the Department of the Army (DA 1992a and DA 1992b). The new CoE supports the Army policy and will monitor its implementation in the Corps of Engineers.

The next step is to begin a review of the different TQM philosophies. In the TQM survey, all of the respondents cited that a mix of styles was the best approach. There is no readily adaptable philosophy and each organization must take the core principles of TQM and form a coherent TQM philosophy for their organization. The review is best begun by undertaking a literature study. Authors frequently cited include: Deming (1986), Juran (1989), Crosby (1979), Carr and Littman (1990) and the Federal Quality Institute (1991). Other resources for TQM information include: attending seminars; using FQI; and contacting other districts, divisions, or DoD organizations which have already implemented TQM and have been identified earlier in this thesis.

At this point, the senior leadership has probably begun to form an opinion whether to implement TQM. The step of engaging a consultant is one that is both recommended and generally undertaken (Aguayo 1990). In the TQM survey, 75% of the respondents used a consulting firm. The extent to which a consultant is engaged is not universally agreed upon; however, consultants are usually

considered essential during the initial implementation of TQM. The Federal Supply Catalog lists a number of consulting firms that can be contracted (FQI 1990b). Too often, the TQM journey involves a series of successes and setbacks in the initial stages. A consultant can make this initial part of the journey less bumpy.

Whether or not a consultant is engaged, the next step is to begin senior leadership TQM training. The initial training should include as a minimum the history, philosophy, principles and tools of TQM (FQI 1992a). One of the primary objectives of the training should be to illustrate the "new" role for management in a TQM organization. The extent with which this "new" role is embraced by senior leadership is the determining factor in the success of TQM implementation.

Before moving to Phase II several actions must be completed. One of the first is to appoint an internal TQM coordinator. The person selected should be organization's best manager -regardless of his current function. He should be respected throughout the organization, have superior leadership and communications skills, and have demonstrated the ability to manage large complex projects in the past (Berry 1991). The TQM coordinator does not become the director of quality for the organization. He is primarily an advisor to the executive steering committee and his/her duties generally include: (1) becoming the organization's TQM expert; (2) advising the district commander and ESC concerning TQM; (3) monitoring activities of PAT's; and (4) serving as executor of TQM policy.

Another required action is to appoint an executive steering committee (ESC) -- also known as a quality council. The executive steering committee is

responsible for TQM policy in the organization. Its responsibilities typically include: (1) the formulation of the organization's mission and vision statements and the organizations strategic goals and objectives; (2) establishing a system for selecting process improvement opportunities; (3) ensuring implementation of process improvements and the long-term monitoring of them; (4) defining scope and limit of PAT projects; and (5) development of the organization's implementation plan.

One of the first tasks for the ESC is to develop a training plan for the organization's employees. The initial focus is to provide introductory TQM training (similar to that which senior leadership underwent) to all employees. The training is typically conducted by outside consultants until a cadre of trainers is established to take over the conduct of the training. Note that in the TQM survey, all the respondents used outside consultants to conduct the initial training for employees. The training should not begin until the ESC is prepared to move onto Phase II.

As an adjunct to the initial training, the senior leadership should conduct an organizational assessment. In the TQM survey, 75% indicated that they would conduct an organizational assessment and 33% had completed it. The assessment can be prepared internally (Johnson 1992b), be furnished by a consultant (Dawson 1992), or be in the form of the DoD organizational assessment tools available (DoD 1991b; DoD 1991c). The results of the assessment should be used in preparation of the implementation plan and gives the ESC both quantitative and subjective data concerning the organization's and client's attitudes toward quality.

## 5.3 Phase II - Planning and Preparation

The Planning and Preparation Phase is the critical Phase in TQM implementation. It is the second part of the Do Step of the PDCA Cycle Model. Often, organizations experience cycles of successes and setbacks during the implementation of this Phase. Failure by the senior leadership to effectively plan training, insistence on rapid results, and lack of senior leadership commitment are examples of potential problems during the planning and preparation Phase. The TQM journey is rarely undertaken without encountering problems along the way. It is the responsibility of senior leadership to mitigate the effects of these problems and keep the organizational focus on continuous improvement. The steps of this Phase are outlined in Figure 8 below and discussed in detail in Sections 5.3.1 through 5.3.3 that follow.

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                    ┌─────────────────────────────┐
                    │ PHASE II                    │
                    │ Planning and Preparation Phase │
                    └─────────────────────────────┘
```

| Formulate Quality Policy | Form quality infrastructure | Begin TQM training | Complete following actions |
|---|---|---|---|
| Publish mission statement | Form Quality Management Board | Establish training groups | Begin process identification |
| Publish vision statement | Form Process Actions Teams | Establish training courses | Determine customer satisfaction level |
| Publish strategic goals & objectives | | Monitor training Ensure it is used | |
| Establish PDCA Cycle | | | |
| Review reward & evaluation system | | | |

**Figure 8.  Model for Phase II Steps**

## 5.3.1  Formation of Quality Policy

The first step in this Phase is the formulation of the organization's vision and mission statements. The purpose of the vision statement is to give direction to the organization for the next 5 to 10 years or longer. It should be simple, in specific terms and set a common goal for the organization (FQI 1990a). As an example, the Louisville District Vision Statement is "Entering the 21st Century as a

leader committed to its people and customers and providing innovative quality performance to our Nation's needs" (Klinstiver 1992). Another example is the Savannah District Vision Statement -- "We achieve excellence in mission accomplishment through caring -- Caring Leadership of Corps people, Caring Partnerships focused on serving our customers and Caring Stewardship of our Nation's natural resources" (Dale and Font 1992).

The mission statement defines the purpose of the organization. Every military organization has a mission statement. Viewed in a TQM vein, the mission statement transforms from an internal focus to an external customer focus. The organization needs to re-write its mission statement based on customer needs and satisfaction. It should be tied to the vision statement insofar as the tasks in the mission statement support achievement of the organization's vision. The mission statement serves as the basis for identifying those processes that need improvement because it identifies the critical tasks that the organization must perform to sustain its existence. The Fort Worth District mission statement is shown below (Anderson 1992).

> Within our district boundaries, the Fort Worth District provides:
>
> - Project management for Army and Air Force facility construction
>
> - Total project management for Water Resource Development (Civil Works) activities and facilities
>
> - Comprehensive real estate services for Military and Civil Works programs
>
> - Management, operation, and maintenance of natural resource facilities

- For the administration of laws and regulations for the protection of the environment

- Emergency management response to national emergencies and natural disasters

- Project management services to other Government agencies

After formulation of the vision and mission statements, the ESC develops strategic goals and objectives. The strategic goals and objectives are the linkage between the vision and mission statements. The strategic goals and objectives should be broad based and generally phrased in terms of: (1) product performance; (2) quality competitiveness; (3) quality improvement; (4) reduction of cost of quality; and (5) performance of macroprocesses (Juran 1992).

The strategic goals and objectives can be conveyed in several ways. The Louisville District uses long-term (5 years), medium-term (3 years) and short-term (1 year) goals to support its strategic objectives (Dawson 1992). The Savannah District lists four goals:

(1) Achieve the mindset of more integrated teamwork; achieve and sustain the characteristics of a high performing "team of teams."

(2) Promote caring attitudes through the 3 C's of caring.

(3) Improve management of District resources.

(4) Enhance District reputation.

The goals have 5-8 strategies listed beneath each goal that define the tasks necessary to accomplish the goals (Dale and Font 1992).

Initially, the goals and objectives will be broad based. The critical step in forming these goals and objectives is policy deployment. Policy deployment entails

two tasks. One task is to sub-divide the goals and objectives into short, medium, and long term goals and objectives. The second task is to further define the goals and objectives until "ownership" is achieved. Ownership is reducing the task until the particular organizational element is identified for its accomplishment. This element can be a particular division, such as engineering or a function across division boundaries. Until the goals and objectives are defined in terms that the employees can identify, they will not be successful.

The ESC is also responsible for developing the process improvement cycle, also known as the PDCA cycle (as defined in Section 3.1). The PDCA cycle (developed by Dr. Shewhart) is the universally accepted mechanism for continual process improvement. The core principles are Plan, Do, Check and Act. One of the many variants of the cycle is the Ishikawa PDCA Cycle presented below in Table 13 (Ishikawa 1985).

**TABLE 13. Ishikawa PDCA Cycle**

| Step | Action |
|------|--------|
| Plan | Determine goals and targets |
|      | Determine methods of reaching goals |
| Do | Engage in education and training |
|      | Implement work |
| Check | Check the effects of implementation |
| Act | Take appropriate action |

In his variant, he explodes the PDCA cycle to a macro scale. This is an important distinction to make. Often, organizations fail to achieve total implementation of TQM because they get fixated with improving Quality of Work

Life (QWL) and training employees. Excessive focus on QWL promotes an internal customer quality improvement process that neglects the external customer needs (Applegate, et al. 1991). The responsibility of the ESC is to define, to the extent needed, the level of detail required to ensure that the PAT's (as described in section 3.4.2) successfully implement the PDCA cycle. An example of a PDCA cycle for the PAT process by the Louisville District is included Figure 9 below (Klinstiver 1992).
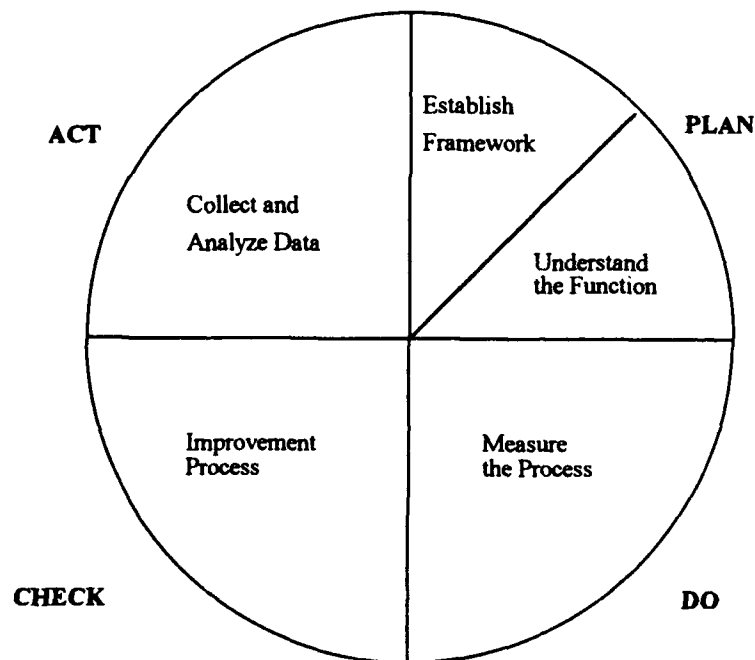


**Figure 9. Louisville District PDCA Cycle**

The Louisville District PDCA Cycle is further developed in the outline included below. Each step in the PDCA Cycle contains a number of sub-steps that key the action that is required to complete each step of the process (Klinstiver 1992).

1. Establish the framework:
   a. Initial parameters
   b. Develop action plan
2. Understand the function:
   a. Customer information
   b. Flowchart the steps in the current process.
   c. Conduct cause and effect analysis.
3. Measure the process:
   a. Identify the most significant outputs being produced
   b. Identify the critical characteristics of performance for each of these outputs.
   c. Develop measures best indicating customer satisfaction.
   d. Decide on performance goals for each measure.
4. Collect and analyze data:
   a. Collect adequate quantities of data to use in analysis
   b. Track where problems occur through data and organization and analysis
5. Improvement process:
   a. Analyze data to identify potential improvement opportunities.
   b. Propose the improvement plan to the sponsor.
   c. With sponsor concurrence, implement a small scale test of the proposed improvement plan.
   d. Monitor the success of the improvement plan using the tools and techniques from the analysis Phases.
   e. If the test is successful, implement on a permanent basis.

Two aspects of cultural changes in the organization that are the subject of much debate are the reward and recognition system and the performance evaluation system. Both of these must be addressed during implementation of TQM. The decision to change either system dramatically can be deferred past this Phase. The issues, however, should be discussed at this point in the TQM journey. The reward system and performance evaluations are derided by Dr. Deming. Deming believes that rewards and performance evaluations promote competition, not cooperation, between workers (Aguayo 1990). Juran calls for new "metrics" when approaching performance evaluations (Juran 1992). What can be done is to institute a recognition system as part of the TQM implementation effort that does not promote competition among employees; rather, it encourages cooperation. When developing reward systems, the organization should make rules, set a budget, use originality, be timely and reward the whole team for success. Following this prescription will enable an organization to achieve a quality reward and recognition system for its employees. Many districts (e.g., Portland, Louisville) have TQM based awards systems that can be used for guidance.

The problem of performance evaluations is that they are mandated by law. While the mechanics cannot be changed easily, the use of performance evaluations can be changed. An organization cannot achieve company-wide acceptance of TQM if its rating system remains based on the old management philosophy. By using these methods, it communicates to the worker that quality is not the management priority. Instead of listing objectives that encourage short term

results, managers must apply the same long-term quality planning and definition to the workers' goals and objectives.

5.3.2 Quality Infrastructure

The ESC must develop the quality infrastructure in the organization. One of the first tasks is to form Quality Management Boards (QMBs). The QMB's responsibilities typically include: (1) oversee process improvement actions in assigned area; (2) organize PAT's; (3) select process improvement opportunities and define goals for PAT's; (4) implement PAT recommendations; and (5) act as linkage between ESC and PAT's.

The QMB's should be permanent cross-functional teams and should include members that also serve on the ESC. The Fort Worth District initially formed four QMB's in the following areas: environmental services, civil programs, military programs, and internal services. As the TQM implementation effort matures, more QMB's may be formed.

The QMB's are responsible for the formation of Process Action Teams. PAT's can be functional teams, cross-functional teams, or task teams. Initially, PAT's will only be formed along functional lines. Participation should be voluntary and hinges on the training provided to the PAT members. Again, as the TQM implementation effort matures, cross-functional and task teams will be formed. An important point is determining to whom the PAT reports. PAT's can be "chartered" by the ESC or QMB's. This distinction and its impact should be included in the charter for the organization. Typical responsibilities for PAT's include: (1) documenting the process "as it is"; (2) data collection and analysis of

key process variables and effects of changes; and (3) identification and recommendation of areas for improvement (FQI 1990a).

### 5.3.3 TQM Training

The ESC and TQM coordinator are responsible for expanding the organization training plan beyond the initial introductory training. The four categories for personnel are: senior leadership, mid-level managers, supervisors, and employees. Senior leadership is defined as the members of the ESC. Mid-level managers are the QMB members. Supervisors are the facilitators, instructors, and team leaders. Employees are the team members. A typical training matrix is seen in Table 14 below. The table shows both the training groups and the skills they must learn. The symbols in the table reflect the level of training required -- a "T" indicates ability to train others in the subject, a "M" indicates mastery of the subject, and a "F" indicates familiarization with the subject.

**TABLE 14. TQM Training Matrix**

| Training Courses | Category of Personnel | | | |
| --- | --- | --- | --- | --- |
| | Senior Leadership | Mid-level Managers | Supervisors | Employees |
| Orientation | T | T | T | M |
| Awareness | T | T | T | M |
| Team Member Skills | M | M | T | M |
| Team Leader Skills | M | M | T / M | M / F |
| Facilitator Skills | M | M | T / M / F | F |
| Executive Skills | M | M / F | F | F |

The orientation course is the basic introductory course that is given to all employees once the decision is made to implement TQM. The awareness course is given to all members of the organization as they become involved with TQM and is modified to suit the needs of the target audience. The team member course is designed to provide the skills necessary for the individual to function as a member of a PAT. The team leader course prepares individuals to function as a PAT leader. The facilitator course is the most important training in the initial stages of implementation. The facilitators guide the efforts of the PATs and serve as the instructors for the Team Leader and Member courses. The executive course is designed to hone the skills needed to develop quality planning in the organization.

The awareness course generally includes the following topics:
(1) organization mission, vision, and strategic goals and objectives
(2) history of TQM to include overview of prominent gurus
(3) organization training and implementation plan for TQM
(4) use of seven SPC tools

The team member and leader courses focus on group-problem solving techniques (nominal group technique, brainstorming, and PDCA cycle) and the use of the seven statistical process control tools. These seven statistical tools include: check sheets, pareto analysis, Ishikawa diagram, histogram, scatter diagram, graphs (line, bar and pie charts), and control charts (DoD 1990a). The team leader course would also include training in management techniques such as: coaching and mentoring, effective meeting techniques, and group dynamics (FQI 1992a).

The facilitator course should supplement the team leader course's training with additional training in interpersonal dynamics, advanced statistics, and presentation skills (FQI 1992a). Facilitators are also expected to be instructors for future courses.

The executive course builds on the initial TQM training undertaken during Phase I with a more in-depth review of TQM. The primary focus is on developing quality planning skills. The seven management and planning tools that can be taught are: affinity diagram, interrelationship digraph, tree diagram, prioritization matrices, matrix diagram, process decision program chart, and activity network diagram. Additional subjects include Hoshin planning (policy management deployment) and quality function deployment (FQI 1992a).

Before moving to Phase III, the ESC must oversee two actions. The first action is to increase both the number and intensity of the methods used to determine customer satisfaction. Organizations naturally sharpen their customer focus when they implement TQM. Organizations can use focus groups, customer visits and interviews, and brief questionnaires to assist them in determining external customer needs. The organization needs to also increase awareness of internal customer needs. The second action that needs to be begun is process identification or process mapping. When process identification is done, customers naturally fall out as recipients of output from the processes. In this manner, "new" customers are discovered. Analysis of these customers yields who are the vital few customers that you should concentrate your quality efforts towards (Juran 1992).

## 5.4  Phase III - Implementation

The Implementation Phase steps are given in the model in Figure 10 below and discussed in Section 5.4.1 that follows.

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                    ┌──────────────────────────────┐
                    │   PHASE III - Implementation  │
                    └──────────────────────────────┘
                                   │
        ┌────────────┬─────────────┼─────────────┬───────────────┐
        ▼            ▼             ▼             ▼
┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
│ Choose       │ │ Training     │ │ Publicize    │ │ Involve      │
│ implementation│ │ (TQM and    │ │ successes    │ │ vendors      │
│ strategy     │ │ job-related) │ │              │ │              │
└──────────────┘ └──────────────┘ └──────────────┘ └──────────────┘
        │            │
        ▼            ├─────────────┐
┌──────────────┐     ▼             ▼
│ Select       │ ┌──────────────┐ ┌──────────────┐
│ pilot project│ │ Train job    │ │ Retrain      │
└──────────────┘ │ skills       │ │ new skills   │
        │        └──────────────┘ └──────────────┘
        ▼
┌──────────────┐
│ Implement    │
│ organization-wide│
└──────────────┘
```
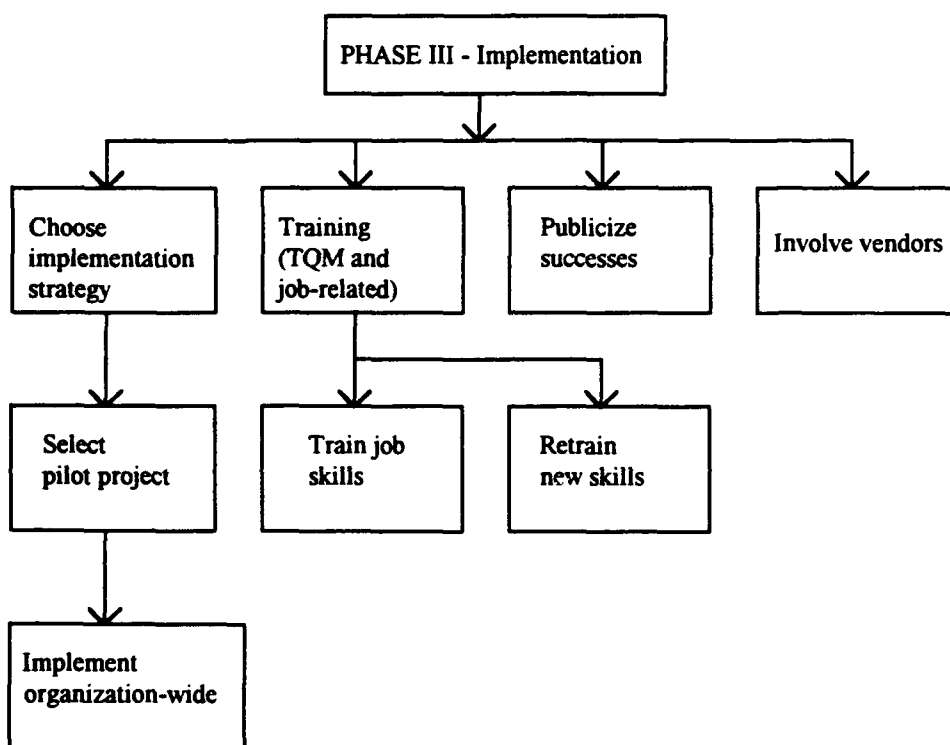
**Figure 10.  Model for Phase III Steps**

### 5.4.1  Discussion of Implementation Phase Steps

The Implementation Phase is the *Do* Step of the PDCA Cycle Model. Implementation can be started anytime within the implementation effort because TQM is an evolutionary process. The best means to speed the process is to choose pilot projects. Selection of a pilot project involves several criteria:  (1) choose a site that is away from the main headquarters if possible, (2) select one of your best

managers to oversee the project, and (3) select good initial projects (Berry 1991).
The advantages of a pilot project are that missteps can turn into lessons learned
without disrupting the entire organization, that the pilot effort can be used as a
model for broad scale implementation, and that resistance is minimized by using
your TQM "champions" as directors of the project (FQI 1990a). Juran supports
the use of pilot projects and states that "The results of the pilot tests in due course
become the means for converting the skeptics into believers" (Juran 1992). In the
Portland District, initial pilot projects yielded savings of only $31,800 in 1989 and
$17,500 in 1990. In 1991, the early success of the pilot projects and the resulting
publicity that accompanied them produced a dramatic rise in project suggestions
and savings that totaled $420,900 (Johnson 1992a).

Rather than use pilot projects to begin implementation, the other option is
to implement a broad scale approach to TQM. The problem with broad scale
implementation is that your organization sub-elements will not proceed at the same
pace concerning embracement of TQM. The best approach is to use pilot projects
and publicize their success.

Individual training and re-training continue through the Implementation
Phase. The principle of just-in-time training whereby the needed training is
provided just prior to its need is an admirable goal, but difficult to accomplish
without careful planning. Training is the key to maintaining the momentum begun
by the pilot projects; however, training presents a number of potential pitfalls.
Training employees too soon allows the skills to erode before they are used. Other
problems include: not having the right mix between philosophy and tools, failing to

require that the training be used when the individual returns to the job, and expecting that training is all that is required for TQM to thrive (Applegate, et al. 1991). It is important that TQM training does not become viewed as the only training required by the employees. Job related training must continue to occur, because improperly trained workers cannot achieve statistical control in their jobs (Aguayo 1990).

One of the important items for the ESC is to publicize the success of the implementation. Techniques used include: newsletters, displays, video and slide presentations, articles and celebration of "Quality Days" (Dawson 1992). Although Dr. Deming dismisses outright slogans and exhortations as being counterproductive, slogans can be part of a well-planned TQM implementation effort (Aguayo 1990). The problem with slogans, banners and other similar "programs" is that they become the focus of the TQM plan. Simply willing or wishing quality to occur will not make it happen.

As the implementation effort matures during the Implementation Phase, it moves toward a company-wide expansion. Implementation is expanded to include the vendors with which the organization is affiliated. The same quality principles are involved and it is important that the process is not adversial. Cooperation between the organization and its vendor-suppliers will increase the quality of the goods and services produced (Aguayo 1990).

5 5 Phase IV - Sustainment

The Sustainment Phase encompasses both the Check and Act Steps of the PDCA Cycle Model. The Sustainment Phase is a succession of actions designed to

maintain the continuous improvement process. The Check Step actions include: conducting QC audits, re-training personnel, re-confirming senior leadership commitment and creation of new teams. The Act Step actions include: applying for Awards, strategic and long-range Quality planning, absorption of initial quality staff, and moving from Little Q to Big Q (Juran 1992). A model of the Phase IV steps is given in Figure 11 below and discussed in detail in Sections 5.5.1 and 5.5.2 that follow.

```
                    ┌─────────────────────────┐
                    │  PHASE IV - Sustainment │
                    └────────────┬────────────┘
              ┌──────────────────┴──────────────────┐
              ▼                                      ▼
    ┌──────────────────┐                  ┌──────────────────┐
    │ Sustainment      │                  │ Sustainment      │
    │ Check Steps      │                  │ Act Steps        │
    └────────┬─────────┘                  └────────┬─────────┘
             ▼                                     ▼
    ┌──────────────────┐                  ┌──────────────────┐
    │ Reaffirm senior  │                  │ Apply for awards │
    │ leadership       │                  │                  │
    │ commitment       │                  │                  │
    └────────┬─────────┘                  └────────┬─────────┘
             ▼                                     ▼
    ┌──────────────────┐                  ┌──────────────────┐
    │ Re-training      │                  │ Absorb additional│
    │ of personnel     │                  │ positions        │
    └────────┬─────────┘                  └────────┬─────────┘
             ▼                                     ▼
    ┌──────────────────┐                  ┌──────────────────┐
    │ Conduct QC audits│                  │ Broaden from     │
    │                  │                  │ Little Q to Big Q│
    └────────┬─────────┘                  └──────────────────┘
             ▼
    ┌──────────────────┐
    │ Increased use of │
    │ cross-functional │
    │ teams            │
    └──────────────────┘
```
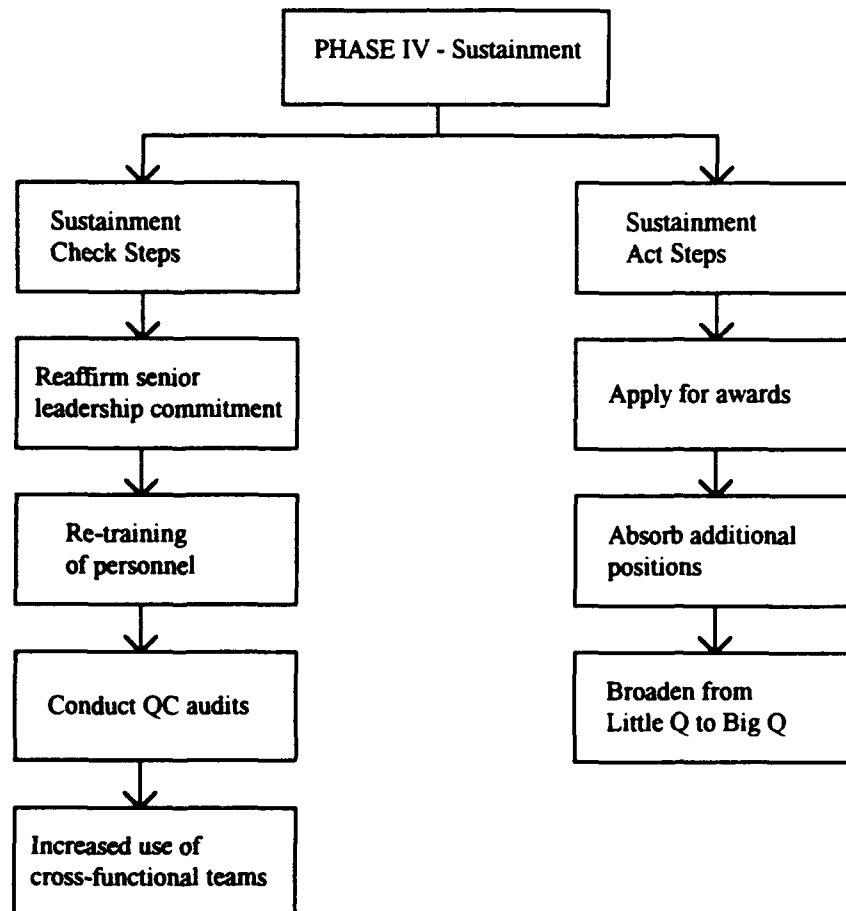
**Figure 11. Model for Phase IV Steps**

### 5.5.1 Sustainment Check Steps

Once the TQM implementation effort reaches maturity in the organization, the tendency is to think that the TQM process will sustain itself indefinitely. Although the military commander should be viewed as the TQM champion in the organization, he should not be viewed as the sole "owner" of the TQM implementation effort. It is important that there be civilian TQM champions in the organization -- especially among the influential civilian leaders in the organization. The military commander must achieve a "critical mass" of support composed of himself and the other influential civilian TQM champions in order to sustain the momentum of TQM in the organization (Berry 1990). The two barriers to implementation most often cited in the survey were lack of senior leadership commitment and viewing the implementation effort as just another program. In order to overcome the barrier of TQM implementation being viewed as just another program, it is important the civilians have an active role in implementing TQM in the organization. This is fundamental to the success of TQM implementation. The difficult task for the military commander is finding the right mix of military and civilian roles in TQM implementation. Anthony J. DeLuca, Co-Chair of the Air Force Productivity Action Group said the following about TQM in the military (Varian 1990).

> TQM in the military should not be the mirror image of, say, TQM at Ford Motor Company. We have to retain some fundamental truths -- our mission is to deter war, not sell cars. But there is no doubt in my mind that TQM has a vital role to play in that mission. We just have to find our own way.

It is critical that top leadership retain its commitment to TQM and continue to direct the TQM implementation efforts in the organization. Dr. Deming advises that new and different ideas do not rise up from the bottom of the organization very well (Aguayo 1990). It remains the responsibility of the senior leadership to listen, to continue to learn, and to involve quality in all facets of the organization. To prevent the senior leadership from abrogating their responsibility, the commander of the organization must re-confirm the senior leadership commitment on a periodic basis (Ishikawa 1985).

Senior leadership should regularly conduct quality audits of their organization to ensure that TQM has been undertaken successfully. Types of quality audits include: (1) audit by the commander; (2) audits by division heads; (3) audits by the QC staff; and (4) audits by division of each other (Ishikawa 1985). The principal guide for QC audits should be the Quality Improvement Prototype Award (Appendix F) and the Presidential Award for Quality (Appendix G) guidelines published annually by the Federal Quality Institute.

One of the key points for TQM sustainment is the re-training of personnel. The organization will gain and lose personnel over time. Some of the personnel losses will be the facilitators and team leaders who guided the initial development of TQM in the organization. Additionally, all the PAT's will not be continuously chartered in the pursuit of process improvement opportunities. It is critical that the employees receive training for new skill positions and re-training in order to retain the needed skill levels (Applegate, et al. 1991).

The final Check Step is the creation of new teams. As strategic goal setting and planning become the norm for the organization, it will need cross-functional teams to address the processes that overlap department boundaries. The initial process improvements are likely the result of departmental teams because of their less complex nature. Although the formation of cross-functional teams is begun during Phase II, the mature TQM organization increasingly relies on cross-functional teams to achieve process improvement.

### 5.5.2 Sustainment Act Steps

Applications for awards are a positive sustainment step for an organization to take. Competing for the Presidential Award for Quality or the Quality Improvement Prototype Award sharpens the focus of the organization. It provides feedback to the organization that is continuous improvement process is working.

Several DoD organizations have won these awards in recent years. In 1989, the Naval Air Systems Command won the Presidential Award for Quality. Winners of the Quality Improvement Prototype Award include: Cherry Point Naval Aviation Depot, Norfolk Naval Shipyard, and the Sacramento Air Logistics Center (FQI 1991). These awards provide both an excellent source for judging the success of your TQM implementation effort and a standard to measure it against throughout DoD.

One of the remaining steps in the Sustainment Phase is to absorb the "additional" positions created for the Quality staff back into the company. At this point in the implementation plan, continued reliance on the talent and work of the individuals who brought the implementation effort this far may begin to be

counterproductive because of "burnout". Appointing individuals to replace them may be necessary to continue the success of the TQM implementation effort.

As a guide to whether organization-wide TQM is occurring, Table 15 is included below. The table demonstrates the differences between an organization that has not achieved organization-wide TQM (Little Q) and an organization that has reached maturity in its continuous improvement process (Big Q). The Table is aimed at a manufacturing organization, but it is readily adaptable to a service organization such as the Corps of Engineers.

The Sustainment Phase does not conclude the TQM journey. The PDCA Cycle Model continually revolves as process improvements are made and the sustainment checks and actions are based on the use of the PDCA Cycle.

An example sustainment activity is the QC audit. The QC audit is planned in accordance with the guidelines of the Plan Step in the Cycle. The QC audit is conducted (Do Step), the results are checked (Check Step) and actions are taken based on the results (Action Step). When this cycle of improvement becomes the established pattern for decision-making in the organization, the TQM journey has fostered a mature TQM implementation process in the organization.

TABLE 15. Juran's Contrast of Big Q and Little Q (Juran 1992)

| Topic | Content of Little Q | Content of Big Q |
|---|---|---|
| Products | Manufactured goods | All products, goods and services, whether for sale or not |
| Processes | Processes directly related to manufacture of goods | All processes; manufacturing support; business, etc. |
| Industries | Manufacturing | All industries; manufacturing; service; government, etc., whether for profit or not |
| Quality is viewed as: | A technological problem | A business problem |
| Customer | Clients who buy the products | All who are impacted, external and internal |
| How to think about quality | Based on culture of functional departments | Based on the Universal Trilogy |
| Quality goals are included: | Among factory goals | In company business plan |
| Cost of poor quality | Costs associated with deficient manufactured goods | All costs which would disappear if everything were perfect |
| Improvement is directed at: | Departmental personnel | Company performance |
| Evaluation of quality is based mainly on: | Conformance to factory specifications, procedures, standards | Responsiveness to customer needs |
| Training in managing for quality is: | Concentrated in the Quality Department | Companywide |
| Coordination is by: | The quality manager | A quality council of upper managers |

## 5.6 Summary

The following outline is a step-by-step summary of the material presented in this chapter. Note that each of these areas must be addressed in order to fully implement TQM.

I. Phase I: Exploration and Commitment

    A. Recognize the need for change

    B. Review TQM philosophies

    C. Initiate TQM education

        i. Engage consultant

        ii. Conduct senior leadership training

    D. Complete initial TQM actions

        i. Appoint TQM coordinator

        ii. Form an Executive Steering Committee

        iii. Develop training plan for employees

        iv. Conduct an organizational assessment

II. Phase II: Planning and Preparation Phase

    A. Formulate Quality Policy

        i. Publish mission statement

        ii. Publish vision statement

        iii. Publish strategic goals and objectives

        iv. Establish the process improvement model (PDCA cycle)

        v. Review reward and evaluation systems for consistency

    B. Form quality infrastructure

       i. Form the Quality Management Board (QMB)

       ii. Form Process Action Teams (PAT's)

  C. Begin TQM training

       i. Separate personnel into four groups: senior leadership, mid-level managers, supervisors, and employees

       ii. Establish the following courses: orientation, awareness, team member and team leader skills, facilitator skills, executive skills

       iii. Monitor training, re-schedule as needed, and ensure that it is used immediately after completion of the course

  D. Complete following actions

       i. Increase intensity and methods of determining customer satisfaction

       ii. Begin process identification or mapping

III. Phase III: Implementation

  A. Choose an implementation strategy

       i. Select a pilot project as part of limited-scale initial implementation

          a. Select a good project, away from headquarters, and choose best manager to lead

       ii. Implement on an organization-wide basis

  B. Training (TQM and job-related)

       i. Re-training to retain skills

       ii. Training for new employees and new skill development

C. Publicize the successes during TQM implementation

D. Involve organization's vendors with TQM implementation

IV. Phase IV: Sustainment

A. Sustainment Check Steps

i. Senior leadership must remain committed and responsible for TQM in the organization

ii. Conduct QC audits

iii. Re-training of personnel

iv. Increased deployment and reliance on cross-functional teams

B. Sustainment Act Steps

i. Apply for awards

ii. Absorb additional positions created in initial phases of TQM implementation

iii. Broaden Little Q into Big Q in the organization

# 6. CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Conclusion

One of the objectives of this thesis was to trace the development of TQM policy guidance from the Federal Government down to the Army Corps of Engineers to establish a reference point from which to proceed. The data collected concerning TQM implementation by CONUS based districts and divisions disclosed several trends. TQM implementation in the Corps of Engineers follows a common profile. Most of the decisions to implement TQM have occurred in the last 12 months with only 15 of 46 (33%) divisions and districts actually having a TQM implementation effort. The philosophical basis is a mixture of prominent TQM expert teachings. Sources of assistance have primarily been literature and consultants. The quality infrastructure is slowly being developed in consonance with the training required as part of TQM implementation. Organizations are finding that TQM is hard work and requires more of their time, money and effort than they expected. Many barriers to implementation are being encountered. Securing senior leadership commitment and dispensing the notion that TQM is "just another program" is proving to be difficult. Finally, TQM implementation is proceeding slowly due to its perceived lack of priority and competing interests among other Corps of Engineers' quality initiatives.

The Corps of Engineers needs to become an active player in the implementation of TQM. Other service organizations throughout the U.S. are having great success. Rather than publishing a model implementation plan for its

subordinate organizations to follow, the Corps of Engineers needs to develop its vision statement, mission statement, and strategic goals. Additionally, the Corps should establish a cadre of facilitators to assist divisions and districts with initial training. This action was undertaken by DoD to assist its subordinate organizations as part of the DoD TQM Master Plan. These items will demonstrate the Corps' commitment to TQM. There are a growing number of division and district commanders who believe in the benefits of TQM. In cooperation with them, the Corps' can quickly move in a coordinated approach to TQM implementation.

Two of the major problems to date facing districts and divisions in implementing TQM have been the lack of like organizations to draw upon for models and the general reluctance of the construction industry to adopt TQM. The problem with role models is being abated with the development of TQM programs in roughly one-third of the CONUS based districts and divisions. The construction industry is making significant progress towards TQM implementation due in part to the work of the Construction Industry Institute.

The TQM implementation model presented in this study is intended to be a starting point for those divisions and districts which have yet to implement TQM. The model is based on research concerning implementation and is tempered with the lessons learned from the Corps of Engineer districts and divisions which have already implemented TQM. The model was intentionally made generic to have the widest possible applicability across the diverse organizations that comprise the Corps of Engineer districts and divisions.

## 6.2 Recommendations

If the Corps of Engineers is committed to TQM implementation, then it should consider the following recommendations:

- The Chief of Engineers should become the TQM champion for the Corps of Engineers in order to reflect the senior leadership commitment that TQM requires.

- The Corps of Engineers should publish a mission statement, vision statement and strategic goals for the Corps of Engineers that reflect the new Army management philosophy in the near term.

- The success of the Corps of Engineers quality initiatives (e.g., partnering and ADR) and their familiarity should be used as starting points for developing process improvements in the TQM implementation plans.

- The Corps of Engineers needs to dispel the notion that its quality initiatives are examples of informal TQM programs, and it should ensure that the principles of TQM are correctly implemented in the Corps of Engineers.

- The Chief of Engineers should undertake a comprehensive study of TQM implementation in the Corps of Engineers. The study will provide those divisions and districts which have yet to implement TQM with data that will greatly assist them with preparing implementation plans to conform with the new Army management philosophy.

- The Corps of Engineers should establish a pool of facilitators to assist divisions and districts with implementation.

- The Corps of Engineers should begin senior leadership training with division and district commanders, as well as with senior civilian personnel, in order to develop the critical mass of TQM champions necessary to effect successful TQM implementation in the organization.

- The Corps of Engineers should encourage a mix of military and civilian responsibility to ensure continuity with the TQM implementation efforts.

- The Corps of Engineers may want to select a "pilot division or district" and channel efforts into implementation with the intent of establishing lessons learned for the rest of the Corps of Engineers.

- The Corps of Engineers should use this study as an educational source to further the discussion of TQM in the Corps of Engineers.

## 6.3 Recommendations for Future Research

With the low number of districts and divisions which have implemented TQM and the relative infancy of the current TQM programs, a study should be undertaken within three years to revisit the subject of TQM implementation in the Corps of Engineers. Depending on the extent to which TQM develops in the Corps of Engineers, the study should be in the form of a Quality Control audit fashioned after the guidelines for either the President's Award for Quality, the Quality Improvement Prototype Award, or some Award specifically for TQM excellence in the Corps of Engineers.

# APPENDICES

## Appendix A. Initial Solicitation Letter and Responses

A.1. Initial Solicitation Letter

March 12, 1992

Dear Sir,

I am currently enrolled as a graduate student at the University of Texas at Austin in the Department of Civil Engineering's Construction Engineering and Project Management Program. As part of my studies, my thesis topic concerns the implementation of Total Quality Management (TQM) in the Corps of Engineers.

I understand that TQM is in its nascent stage in the Corps of Engineers; and as such, the implementation is uneven at best throughout the Districts and Divisions. Of primary interest to me are the following general indicators of your program: (1) existence of a program, (2) stage of development, (3) philosophy adopted (Deming, Juran, Crosby, Kaizen, etc.), (4) program implementation (throughout organization or isolated in offices/branches), and (5) impetus to begin the program (self or top-driven). Finally, general overview information on the program's beginning in your organization, to include implementation guidance, is desired.

This research is of particular interest to the University of Texas and the Construction Industry Institute who are currently studying TQM implementation in the private sector. Presumably, the research will be of interest to the Corps of Engineers as a broad overview of TQM. I appreciate any assistance you can give

me in this matter, especially in the form of a point of contact in your office that I may direct further inquiries to.

My address and phone numbers are listed below:

Respectfully,

MAXWELL R. HUGHEY
CPT, EN
Graduate Student

School:  CPT Maxwell R. Hughey  
Graduate Student, ECJ 5.200  
College of Engineering  
University of Texas  
Austin, TX 78712  
(512) 471-4648

Home:  CPT Maxwell R. Hughey  
706 Windsor Rd  
Round Rock, TX 78664-7643  
(512) 218-8246

A.2. Responses to Initial Solicitation Letter

This table summarizes the responses by division and district to the initial solicitation letter.

**Table 16. Responses to Initial Letter**

| LOCATION | TQM | STATUS | COORDINATOR | PHONE # |
|---|---|---|---|---|
| L Mississippi Valley Div | N | | | |
| Memphis | N | | | |
| New Orleans | N | Informal | | |
| St. Louis | Y | | Anson Eickhorst | (314) 331-8470 |
| Vicksburg | N | | | |
| | | | | |
| Missouri River Div | N | | | |
| Kansas City | N | | | |
| Omaha | N | | | |
| | | | | |
| New England Div | N | | | |
| | | | | |
| N Atlantic Div | N | | | |
| Baltimore | N | | | |
| New York | N | | | |
| Norfolk | N | | | |
| Philadelphia | N | | | |
| | | | | |
| N Central Div | N | | | |
| Buffalo | N | | | |
| Chicago | N | | | |
| Detroit | N | Informal | | |
| Rock Island | N | | | |
| St. Paul | N | | | |
| | | | | |
| N Pacific Div | N | | | |
| Portland | Y | | David Johnson | (503) 326-6029 |
| Seattle | Y | | Claudette Elliott | (206) 764-3524 |
| Walla Walla | N | Informal | | |

| LOCATION | TQM | STATUS | COORDINATOR | PHONE # |
|---|---|---|---|---|
| **Ohio River Div** | N | Informal | | |
| Huntington | N | | | |
| Louisville | Y | | Dave Klinstiver | (502) 582-5603 |
| Nashville | N | Informal | Betty Powell | (615) 736-5626 |
| Pittsburgh | N | Informal | | |
| | | | | |
| **S Atlantic Div** | N | | | |
| Charleston | N | | | |
| Jacksonville | Y | | Jim Boone | (904) 232-2583 |
| Mobile | Y | | Larry Green | (205) 690-2511 |
| Savannah | Y | | CPT Carlos Font | (912) 652-5885 |
| Wilmington | Y | | William Dawson | (919) 251-4807 |
| | | | | |
| **S Pacific Div** | N | | | |
| Los Angeles | N | | | |
| Sacramento | N | | | |
| San Francisco | N | | | |
| | | | | |
| **Southwestern Div** | Y | | Ray Russo | (214) 767-2353 |
| Albuquerque | Y | | Jim McAdoo | (505) 766-3829 |
| Fort Worth | Y | | Roger Anderson | (817) 334-2179 |
| Galveston | Y | | CPT Ray Schultz | (409) 766-3001 |
| Little Rock | Y | | Jim Wilbanks | (501) 324-5548 |
| Tulsa | Y | | Dale Maxwell | (918) 581-7380 |
| | | | | |
| **Transatlantic Div** | Y | | Ollie Werner | (703) 665-3796 |
| | | | | |

## Appendix B. Solicitation Letter and TQM Survey

August 4, 1992

POC Name:

I am an Army officer currently enrolled at the University of Texas at Austin working on my Masters thesis. My thesis topic is "Implementation of TQM in the Corps of Engineers." As part of my research, I have identified those divisions and districts that have begun implementation of TQM. To complete my data collection efforts, I am forwarding the enclosed survey. I would appreciate your assistance in completing the survey and returning it to me via the enclosed stamped envelope as soon as possible

The goal of the survey is to identify trends throughout the Corps of Engineers regarding TQM implementation. I have tried to construct the survey so that it is not burdensome to complete. If a question does not pertain to your organization given your current level of implementation, leave it blank. I plan to follow-up each survey with a phone call to resolve questions that may arise.

The intent of my thesis is to present an overview of TQM in the Corps of Engineers. Naturally, it will include recommends and conclusions about what has taken place to date. I hope that those divisions and districts that have yet to implement TQM will use this document as a reference to begin their efforts. In its final form, my thesis will indicate what districts/divisions I surveyed and the results of the survey. I will not publish any material specific to your situation without subjecting it to your review first.

Again, I would like to thank you for your assistance with this matter. My address and phone numbers are listed below. Please call me if there is a question.

Sincerely,

MAXWELL R. HUGHEY
CPT, EN
Graduate Student

School: CPT Maxwell R. Hughey       Home: CPT Maxwell R. Hughey
Graduate Student, ECJ 5.200                706 Windsor Rd
College of Engineering                     Round Rock, TX 78664-7643
University of Texas                         (512) 218-8246
Austin, TX 78712
(512) 471-4648

# TQM SURVEY

1) What was the major impetus behind your decision to implement TQM?
   a) internally driven - District Cdr, TQM champion or other
   b) externally driven - higher HQ's (Division or COE)
   Please comment on which was the principal factor.

2) List some of the contributing factors that caused your organization to consider TQM. Examples would be: change in COE mission, customer input, anticipation of downsizing in the COE, and exposure to TQM in conferences and seminars.

3) What sources of assistance with TQM have you used in your TQM program?
   (Circle all that apply)
   a) Academic environment (University or college)
   b) TQM consulting firm
   c) Literature
   d) Federal Quality Institute
   e) Seminars
   f) Other DOD organizations (Navy or Air Force)
   g) Other districts/divisions
   Comment on which of these sources are most valuable to you.

4) When your organization initially adopted TQM, was the original intent to use:
   a) one single TQM "guru" or philosophy
   b) a mix of styles
   Comment on what philosophy has now evolved.

5) What is the current stage of TQM implementation in your organization?
(Please circle only one)

     a) Stage I - characterized by initial planning and training, organizational assessment ongoing, steering committee forming

     b) Stage II - characterized by formation of quality councils, employee training begun, pilot projects selected

     c) Stage III - full implementation

Describe what you have done to date as far as TQM actions

6) When did the TQM program begin in your organization? How long was the exploration stage? (The exploration stage is defined as the time spent deciding whether to implement TQM). If the exploration stage was long, comment on what were the factors involved. Examples would be: reluctance by senior personnel, resource constraints, other priorities, or difficulty in obtaining sufficient information.

7) This question attempts to differentiate between initial planning and actual implementation of TQM?

    A) What areas did you initially target TQM efforts?

      a) Administrative areas only       c) Engineering services only

      b) Construction only           d) District/Division wide

    B) What areas did you actually implement TQM?

      a) Administrative areas only       c) Engineering services only

      b) Construction only           d) District/Division wide

8) Knowing that it is difficult to capture the cost of TQM implementation, check the box in the table below that best satisfies your opinion of what the cost has been to date for your organization -- based on your initial projection.

| | Initial Projections | | |
|---|---|---|---|
| | Money | Time | Effort |
| Less Than Expectations | | | |
| Meet Expectations | | | |
| Exceed Expectations | | | |
| Greatly Exceed Expectations | | | |

9) How would you characterize your current TQM effort?
   a) In-house product
   b) Joint effort of in-house personnel and an outside facilitator
   c) Entirely driven by outside facilitator

10) One generally recognized step during stage one of TQM implementation is process identification or mapping. If your organization has performed this, comment on your findings in terms of benefits of the exercise, perceived vs actual performance levels found, and differences between policy and practice.

11) Another typical TQM implementation step is to perform an organizational assessment. What performance measurements are you using for your organizational assessment? Additionally, are the measurements internally derived or are they externally obtained? Examples of external sources are: customers, COE, construction industry, etc.

12) List any barriers you have encountered in implementing TQM. If you have yet to encounter any, list those that you anticipate.

13) Comment on the role of civilian vs military personnel in the TQM process. Is a conscious decision being made to differentiate between what TQM roles they will fill?

14) Comment on existing programs in your organization that you feel embody some of the precepts of TQM. Examples are: partnering, simultaneous engineering, and alternative dispute resolution.

15) Please include any written material that your organization has produced to date concerning TQM. I am specifically interested in the following:

     a) mission or vision statements

     b) implementation plans

     c) organizational charts depicting existing organization with quality council/teams overlaid

16) Thank you for your assistance in this matter. Please include the name, address and phone number of the individual primarily responsible for completing this survey. I will contact this person if there are questions to resolve.

NAME _____

ADDRESS _____

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## Appendix C. Chief of Engineers' Memorandum

C.1 LTG Hatch's response to the Department of the Army Director of

Management concerning implementation of TQM in the Corps of Engineers is re-

typed below. The memorandum was re-typed due to the poor quality of the copy

available for reprint (Hatch 1990)

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20134-1000

CERM-OP                                                        11 MAY 90

MEMORANDUM FOR   Director of Management, BG William A. Stoffit

SUBJECT:  Total Quality Implementation

1. I completely support the philosophy and principles of Total Quality
Management (TQM). We all agree with providing our customers and partners
QUALITY services. While there are many TQM approaches, I believe quality
improvements must be made within a framework that maintains a balance among
our frequently competing objectives of time, cost and quality. I do not emphasize
one of these above the others for all we do.

2. USACE is firmly committed to improving the quality of everything we do. Over
the last few years, we have targeted improving Customer Satisfaction. This is a
major TQM tenet. I recently conducted an in-depth review of TQM and how
USACE can more directly apply its principles. My conclusion is that USACE
already is actively pursuing improvements that constitute a comprehensive TQM
process (as defined by any of the TQM gurus). In fact, I believe we are 90 percent
of the way there. See the USACE report card at Encl 1. Specifically, we have:

CERM-OP                                                    11 MAY 90
SUBJECT:  Total Quality Implementation

a. Crafted a Vision (Encl 2) that will take us into the 21st Century.  This vision was hammered out by leadership and then circulated to all members -- a TQM characteristic.

b. Adopted Mission and Values statements that emphasize quality ("to provide QUALITY engineering service to the Nation in peace and war" and "Integrity, QUALITY, Professionalism, and Esprit de Corps).  In TQM programs, Quality must be promoted as a universal goal.

c. Embarked on a new Human Resources Development program that acknowledges the essential tie between the work force and achieving progress and improvement.  These Human Resources initiatives include the LEAD Team and other ad hoc process-focused efforts.  TQM requires the doers to get involved in improving their work processes.  Our Human Resources initiatives are pointed in that direction.

d. Instituted a major structural change in how we do business; i.e., we reviewed our major processes and converted to LIFE CYCLE PROJECT MANAGEMENT in order to provide our customers quality products more efficiently.  TQM is work process oriented.

e. Built on the mechanism of our annual Senior Leadership Conference to devote special emphasis to aspects of our business that need improvement.  Our FOCUS 89 cycle has been followed by FOCUS 90 initiatives on Environment and Partnership.  With our Partnership emphasis, we recognize that everything we do, every product we produce is for a customer whether that customer is a member of our own organization or a "customer" in the traditional sense of being external to USACE.  TQM gurus emphasize both customer satisfaction and that TQM is a (continuing) process, not a program.  Our FOCUS mechanism provides that periodic relook -- that continuing feature.

f. Decide to continue our decentralized management of decentralized operations.  I hold my Field Operating Activity (FOA) Commanders responsible for everything they do.  "We are proud to sign our names to our products."  In TQM lingo, organizations must publicize their successes.  We need to do more of this in the future.

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       g.  Concentrated in my Quarterly/Semi-Annual Progress Reviews on measures of performance directed at effective utilization of resources.  Again, measures of performance are an integral element of all TQM approaches.

3.  It looks as though we can maximize the advantages our Quality initiatives have already yielded through a three-pronged effort.  We need to give our successes better public visibility, talk about them together as parts of an on-going Quality initiative, and adapt our USACE training program to support this USACE approach to achieving quality products and satisfied customers.  We have consciously decided to shape USACE into an "Agency of Choice" (among customer alternatives) where the pursuit of quality sharpens our competitive edge. I am tasking my Training Division in Huntsville to adapt and develop courses that will institutionalize our USACE brand of Quality.

Encl

**ORIGINAL SIGNED**
H.J. HATCH
Lieutenant General, USA
Commanding

## Appendix D. Corps of Engineers Quality Initiatives

D.1 Summary of TQM Supporting Initiatives in the Corps of Engineers. (Wallace, 1992)

    1. *Alternate Dispute Resolution (ADR)*. (Begun in 1984). ADR uses TQM principles in problem solving and customer focus in working with the customer as a way to supplement negotiations as an alternative to litigation. TQM principles involved are: Customer Focus, Problem Solving.

    2. *Lead Team*. (Began in 1986). The lead team is working on leadership succession planning which involves training in leadership skills. TQM principles involved are: Leadership of People.

    3. *Information Systems Modernization Program (ISMP)*. (Began in 1987). ISMP is eliminating duplication by standardizing the system to make it the most efficient possible and by treating data as a corporate resource to be shared by all. It is reducing errors by capturing data at its source with no extra reviews. TQM principle involved is Process Improvement.

    4. *Program and Project Management (PPM)*. (Began in September 1988). PPM takes a team approach to ensure customer needs, and the cost, quality and timeliness of products are met. TQM principles involved are: Teamwork, Customer Focus, Top-Down Management Support and Employee Empowerment.

    5. *Leadership Conferences*. (Begun in 1989). These conferences offer participants the opportunity to interact with the Corps senior leaders, work on significant challenges facing the Corps and present their recommendations for solutions to the Senior Leadership as well as to identify and develop their own leadership skills, form teams and observe group dynamics. TQM principle involved is Leadership Development.

    6. *Partnering*. (Begun in August 1990). Partnering is the creation of relationships both between the Corps and its contractors (external customers) and within (internal customers) the Corps itself. The key elements of a partnering relationship are trust, commitment, and a shared vision. Sensitivity, enlightened interpretation, and early identification of problems on both sides are needed. TQM principles involved are: Customer Focus, Top Management Support, and Employee Empowerment.

7. *Command Management Review (CMR).* (Begun in 1990). CMR measures performance indicators generated by the office doing the work. TQM principle involved is Performance Management.

8. *Dual Tracking.* (Begun in 1991). Dual tracking involves modifying current job evaluation factors to represent the work to be done by Corps professionals operating in an environment that requires interdisciplinary, non-standard experts and more flexible teamwork and responsibility. Pay for performance is currently being pursued under the dual tracking umbrella. It will link a portion of individual pay to measurable critical productivity outcomes for each position which will be linked to organizational performance. TQM principles involved are: Teamwork and Quality Culture.

9. *Headquarters Study Board.* (Begun in 1992). This board is comprised of leaders from different stovepipes working together to present informed recommendations from headquarters reorganization. TQM principle involved is Teamwork.

### Appendix E. TQM Implementation Plan for the Corps of Engineers

E.1 Draft implementation plan for the Corps of Engineers. (Wallace, 1992)

## PHASE I. INITIATE THE PROCESS

A. Orient Senior Management

1. Senior management attends a TQM orientation session.

2. Orientation includes training in basic TQM concepts such as cultural change, empowerment, ownership, accountability, etc.

B. Organize the TQM Process

1. There are three areas that could be considered for organizational placement of TQM. The first is directly under the command group to provide the top down management involvement and support that TQM requires. Another area for consideration would be to have TQM report to an executive oversight committee that would provide command guidance and direction. A third area for consideration would be to locate TQM in an organization such as Resource Management but still provide the executive oversight committee. Wherever TQM is placed, it would be necessary to ensure that the two equally significant dimensions; management of work and leadership of people are implemented simultaneously.

2. Senior management jointly establishes the vision of the organization and determines its overall goals and objectives.

3. Senior management communicates the visions, goals, objectives, and values to the staff, and emphasizes that total quality work is everyone's priority and their key as well as the organization's key to success. Senior management also stresses that TQM is not a voluntary or optional effort.

4. Senior management establishes executive boards (Quality Councils) and teams (Process Action Teams) at all organizational levels to integrate issue identification and problem resolution throughout the organization.

## PHASE II. PROVIDE TRAINING AND INSTITUTE TEAM BUILDING

A. Types of Systems Training for Instructors - this training focuses on the work portion of TQM. The Federal Supply Schedule for TQM implementation along with some practical questions is attached and is a convenient method for government agencies to hire TQM services from private contractors.

    1. Training for Team Leader Instructors.

    2. Training for Facilitator Instructors.

    3. Training for Statistical Process Control Instructors.

B. Train a cadre of people who will be instructors in each of the above three categories.

C. Deploy the cadre to develop Team Leaders, Facilitators, and Statistical Process Control Instructors.

D. Types of Team Building Training for Process Action Teams and Organizations - this training should be done at the same time that the work process is being analyzed.

    1. Provide leadership training for the PAT team. This would include learning how to assess the office climate and their own leadership styles; and development of leadership skills, such as motivation and communication with staff.

    2. Provide team training to help the PAT work more effectively as a team. This training would include developing skills in understanding group dynamics, in decision making and communication and conflict management.

    3. Provide team building training in an office between units or between organizations. Extensive use can be made of the Myers-Briggs Type Indicator as a basis for team building to increase cooperation between team members.

## PHASE III. INSTITUTE THE TQM PROCESS

A. Customer Focus - this is aimed at determining whether the activities currently being performed are really satisfying the customer. Long-standing organizations tend to lose sight of their products and their purposes. The TQM system provides that necessary review to ensure that the product being produced is still needed by the customer and that is should be provided in the manner that was established when it was developed.

1. Identify services and products now provided.

2. Identify both internal and external customers who receive these services.

3. Obtain customer views and validate concerns through questionnaires, surveys, face-to-face interviews, etc.

4. Rank importance of products and services from highest to lowest as the customer sees them.

B. Goal Translation

1. Translate customer needs and expectations into goals and quality action plans.

2. Aim goals at exceeding customer expectations.

C. Incorporate customer needs into the organization's way of doing business.

1. Discuss differences between management's and employees' understanding of who their customers are, both internal and external, as well as differences between the customers' needs and expectations and management's and employees' understanding of those needs and expectations.

2. Institute methods of cultural change to bring management and employees closer to the customers' needs and expectations.

D. Involve management in communicating support and encouragement for the TQM process. Top leaders should:

1. Ensure that management empowers their staff to resolve problems within their individual realms of authority, and encourages prudent risk-taking and creative thinking.

2. Ensure that management encourages cross-functional communication, and routine contact with service providers and customers.

3. Ensure that management addressees TQM initiatives in weekly staff meetings.

4. Ensure that management identifies team members, service providers and customers involved in a TQM process to serve on Quality Action Teams (QATs). These QATs will obtain information from their peers to provide to senior management serving on the executive boards (Quality Councils), so that the boards can institute whatever changes throughout the whole organization that are required for continuous quality improvement.

5. Ensure that management establishes a regular schedule for discussing TQM process and initiatives with employees. Management needs to use these meetings to reinforce "ownership", accountability for achieving stated TQM objectives, and employees' problems in implementing these concepts into the standard way of doing business.

6. Ensure that quality improvement goals and objectives are updated continuously from staff members' feedback.

## PHASE IV. CONDUCT PERIODIC REVIEWS

A. Periodic review can be incorporated into existing review mechanisms.

1. Determine the time period for evaluation and incorporate review into an established review process.

2. Integrate the TQM method of evaluating various levels of customer satisfaction with different aspects of service into an existing system. Information should be accurate, comprehensive, timely, and measure all relevant aspects of the organization's processes and services.

3. Establish a system, if one does not already exist, to link customer complaints and changes in needs to those who can act on them.

4. Implement a self-evaluation process which emphasizes personal accountability for owned processes if one has not already been established.

B. Conduct Performance Evaluations.

C. Incorporate Feedback into Performance.

1. Update quality review systems to keep pace with changes in technology, practices, and quality improvements.

2. Assess technology, employee training and service provider quality needs. Compare them to the current environment and develop plans to remove deficiencies and improve processes.

## PHASE V. RECOGNIZE QUALITY ORGANIZATIONS

A. Determine Criteria for Recognizing Excellence within the organization.

B. Create a System for organization-wide Recognition and Communicate it throughout the Organization.

C. Celebrate Team Successes - the goal is to celebrate the success and failures of the Quality Action Team. Its intent is to reward everyone who was involved in the process for their hard work and diligent efforts.

1. The team should plan a festive activity focused around their accomplishments.

2. The celebration should include everyone who assisted the team in its successful endeavors.

3. The team sponsor and team leader should arrange for all appropriate awards, rewards and recognitions.

D. Solicit Nominations for such Awards Outside the Organization such as:

1. President's Council on Management Improvement;

2. Quality Improvement Prototype Award;

3. President's Award for Quality

E. Apply for Quality Awards after a TQM process has been instituted for a minimum of two years.

### Appendix F. Quality Improvement Prototype Award Criteria

F.1. This appendix is an extract of Section IV. Award Criteria from the Presidential Award for Quality 1993 - Application (FQI 1992b).

The annual Quality Improvement Prototype (QIP) Award is administered by the Federal Quality Institute. The award serves two purposes: 1) recognize Federal organizations that have successfully adopted Total Quality Management (TQM) principles and thereby improved the quality, timeliness, and efficiency of their services or products: and 2) provide models for the rest of the Government, demonstrating that a commitment to quality leads to better services and products and more satisfied customers.

The criteria are the basis for applying for the Award, and providing feedback to applicants. They define a quality system -- the key elements of a quality improvement effort and the relative importance and interrelationship of these elements. The criteria embody certain fundamental concepts of Total Quality Management:

- Quality is defined by the customer.

- The organization is driven by continuous improvement.

- The focus is on prevention of errors rather than detection.

- Everyone participates in quality improvement.

- Senior management creates quality values and builds the values into the way the organization operates.

- Employees are valued and recognized for their involvement and accomplishments.

The criteria elements are:

### 1. Top Management Leadership and Support (20 points)

This category examines how all levels of senior management create and sustain a clear and visible quality value system along with a supporting management system to guide all activities of the organization.

a. Describe the roles of key executives (head of applicant organization and senior managers) in TQM activities. Include specific examples of sustained, visible and personal involvement in the development of an effective quality culture.

b. Summarize the organization's policy on quality and describe how "ownership" of the policy by senior management was accomplished and how it is reinforced. Include key strategies used to involve all levels of management and supervision in quality.

c. Describe how senior management communicates its quality vision to all levels, functional units, and employees. Include recent actions that demonstrate the importance of quality values to the organization.

d. Describe how management has established a value system and environment in which individual and group actions reflect a continuous improvement attitude. Include actions taken to evaluate the extent to which quality values have been adopted throughout the organization.

e. Show trends in all allocations to TQM efforts (e.g. funds, staff, time, facilities, equipment) since the beginning of TQM implementation, expressed as a percentage of total budget.

f. Describe specific steps senior management takes to create close cooperation across functional and divisional lines and in different locations to ensure consistent quality improvement throughout the organization.

g. Describe how senior management seeks and obtains the support, cooperation, and participation of the organization's union (if applicable).

h. Describe how the organization's quality policies and improvement efforts reflect its commitment to public health and safety, environmental protection, and ethical conduct.

## 2. Strategic Quality Planning (15 points)

This category examines the organization's quality planning process, quality plans, and how all key quality requirements are integrated into overall planning.

a. Indicate whether operational (one-two year) and strategic (three-five year) goals and objectives for quality improvement exist across the organization that relate directly to the organization's mission, and to the vision and values described in Element 1. Give examples of the most important goals.

b. Give specific plans for quality improvement relating to the most important goals and objectives described in Sub-element a.

c. Describe the process used to establish operational and strategic quality improvement goals, and how goals and objectives are integrated into organization-wide planning and budgeting process. Describe how these plans are implemented and managed on a routine basis.

d. Describe how employees, customers, and suppliers participate in the planning process.

e. Describe the principal types of data, information and analysis used in planning, such as customer requirements, process capabilities, supplier data, benchmark data.

## 3. Customer Focus (35 points)

This category examines the organization's overall customer service systems, knowledge of internal and external customers, responsiveness and ability to meet requirements and expectations.

a. Describe the methods used to obtain a knowledge of external customer requirements and expectations, how this information is shared with relevant employees and how employees use it.

b. Describe the methods used to identify internal customers, determine their requirements, and how this information is shared with employees, and how employees use it.

c. Describe internal and external customer feedback systems, including procedures for handling customer complaints, and how feedback information is used to improve products and services.

d. Describe the organization's service standards derived from internal and external customer requirements and expectations. Indicate how performance relative to these standards is tracked and used to ensure the customer needs are met.

e. Describe the organization's external customer interface practices (i.e., how customer-contact employees are empowered to resolve problems). Describe any special training for customer-contact employees.

**4. Training** (10 points) **and Recognition** (5 points)

This category examines the organization's efforts to develop the full potential of the workforce for quality improvement, as well as its efforts to use rewards and incentives to recognize individuals.

a. Describe the organization's education and training strategy for quality improvement and how this strategy is integrated with the goals and objectives described in Element 2. Describe approaches used to provide education and training (e.g., just-in-time training, train-the-trainer).

b. Describe how the education and training described in Sub-element a. is based on a systematic needs analysis.

c. Describe the types of training provided for all levels of management in support of quality goals. Provide the number of managers who have received this training since the beginning of TQM implementation and the total number eligible who are eligible.

d. Describe the types of training provided for employees in support of quality goals. Provide the number of employees who have received each type of training since the beginning of TQM implementation and the total number eligible for each.

e. Describe how contributions to goals and objectives described in Element 2 are recognized and rewarded. Indicate whether and how team and peer recognition are used.

f. Provide trend data for the past two or more years in employee recognition (i.e., percent of both employees and managers recognized by both individual and team recognition).

**5. Employee Empowerment and Teamwork** (20 points)

This category examines the effectiveness and extent of workforce involvement in TQM, and the approaches used to enhance employee empowerment.

a. Describe the organizational strategy for involving and empowering the entire workforce (including union members) to achieve quality goals and objectives described in Element 2.

b. Describe the specific approaches used to enhance employee empowerment (authority to act).

c. Describe specific means available for members of the workforce (both employees and managers) to become involved in TQM activities, both as individuals and on teams.

d. Provide trend data for the past two or more years related to workforce involvement for each type of activity described in Sub-element c. Express individual involvement as a percentage of the total workforce. Provide number of teams operating in each year.

## 6. Measurement and Analysis (15 points)

This category examines the scope, validity, use and management of data and information that underlie the organization's TQM system; how the data are used to support improvement; and the process for developing measures.

a. Describe the process for developing measures. Describe how measures relate to goals and objectives in the strategic plan as described in Element 2.

b. State whether measures relating to goals and objectives in the strategic plan exist; provide most significant measures.

c. Describe the organization's base of data and information used to measure progress toward goals and objectives. Indicate the scope of the data it contains (e.g., relating to customers, suppliers, internal processes, program and administrative areas).

d. Describe the processes and/or technologies the organization uses to ensure that key data are accurate, consistent, valid, timely and available to those who need it.

e. Describe how and by whom data and information are analyzed to support quality improvement (e.g., to identify problems, determine trends, evaluate performance of key processes). Give specific examples.

f. Describe the organization's approach to selecting areas to benchmark and organizations to benchmark against; the types of data collected; and the ways that comparative data are used for improvement.

## 7. Quality Assurance (30 points)

This category examines the systematic approaches used by the organization to design, assess, control and improve processes and inputs to produce quality products and services. Emphasis is on prevention rather than detection.

a. Describe how new or improved products and/or services are designed and introduced to meet or exceed customer requirements (as described in Element 3), and how processes are designed to produce and/or deliver these products and/or services.

b. Describe the principal means used by the organization to: 1) ensure that processes are adequately controlled to meet design plans and customer requirements; 2) identify and solve root causes of specific problems that disrupt processes; and 3) continuously improve processes.

c. Describe the principal approaches used to assess quality (e.g., systems audits, product or service audits). Include the frequency of such assessments and how the findings are translated into prevention and improvements.

d. Describe how the quality of materials, components, information, and services furnished by external suppliers is assured, assessed and improved.

## 8. Quality and Productivity Improvement Results (50 points)

This category examines the measurable results of the organization's quality improvement efforts. Data tables and graphs summarizing trends and achievement should be utilized as much as possible.

a. List at least three of the most significant indicators of the organization's mission performance as described in Element 6; provide trend data for the past two or more years. Explain any adverse trends.

b. Provide trend data for the past two or more years indicating the level of external customer satisfaction with the quality of major products and services.

c. Provide trend data for the past two or more years for key organizational measures of quality, timeliness, or productivity (other than those listed in Sub-element a.). In addition, provide trend data for the past two or more years for in-process (e.g., rework rate) and end-item (e.g., defect rate) measures. For each measure listed, describe actions taken to produce those results.

       d. Provide trend data for the last two years for performance of major external suppliers.

## Appendix G. Presidential Award for Quality Award Criteria

G.1. This appendix is an extract of Section IV. Award Criteria from the Quality Improvement Prototype Award - 1993 Application. The criteria for this award are very similar to that of the QIP Award. The areas that differ between the two awards are highlighted in italics throughout the extract (FQI 1992b).

The annual Presidential Award for Quality is administered by the Federal Quality Institute. The purpose of the award is: 1) recognize organizations that have implemented Total Quality Management (TQM) in an exemplary manner, resulting in high quality products and services, and the effective use of taxpayer dollars; and 2) promote TQM awareness, and implementation throughout the Federal Government.

The criteria are the basis for applying for the Award, and providing feedback to applicants. They define a quality system -- the key elements of a quality improvement effort and the relative importance and interrelationship of these elements. The criteria embody certain fundamental concepts of Total Quality Management:

- Quality is defined by the customer.

- The organization is driven by continuous improvement.

- The focus is on prevention of errors rather than detection.

- Everyone participates in quality improvement.

- Senior management creates quality values and builds the values into the way the organization operates.

- Employees are valued and recognized for their involvement and accomplishments.

The criteria elements are:

## 1. Top Management Leadership and Support (20 points)

This category examines how all levels of senior management create and sustain a clear and visible quality value system along with a supporting management system to guide all activities of the organization.

a. Describe the roles of key executives (head of applicant organization and senior managers) in TQM activities. Include specific examples of sustained, visible and personal involvement in the development of an effective quality culture. *Highlight any unique or innovative leadership approaches used.*

b. Summarize the organization's policy on quality and describe how "ownership" of the policy by senior management was accomplished and how it is reinforced. Include key strategies used to involve all levels of management and supervision in quality.

c. Describe how senior management communicates its quality vision to all levels, functional units, and employees. Include recent actions that demonstrate the importance of quality values to the organization.

d. Describe how management has established a value system and environment in which individual and group actions reflect a continuous improvement attitude. Include actions taken to evaluate the extent to which quality values have been adopted throughout the organization.

e. Show trends in all allocations to TQM efforts (e.g. funds, staff, time, facilities, equipment) since the beginning of TQM implementation, expressed as a percentage of total budget. *Describe plans for future allocations, showing the long term perspective of the organization.*

f. Describe specific steps senior management takes to create close cooperation across functional and divisional lines and in different locations to ensure consistent quality improvement throughout the organization.

g. *Describe how managers are actively involved in removing barriers to excellence (e.g., de-regulating work, encouraging risk taking and innovation, delegating authority, and discouraging short-cut, quick-fix solutions).*

h. Describe how senior management seeks and obtains the support, cooperation, and participation of the organization's union (if *appropriate*).

i. Describe how the organization's quality policies and improvement efforts reflect its commitment to public health and safety, environmental protection, and ethical conduct.

## 2. Strategic Quality Planning (15 points)

This category examines the organization's quality planning process, quality plans, and how all key quality requirements are integrated into overall planning.

a. Indicate whether operational (one-two year) and strategic (three-five year) goals and objectives for quality improvement exist across the organization that relate directly to the organization's mission, and to the vision and values described in Element 1. Give examples of the most important goals.

b. Give specific plans for quality improvement relating to the most important goals and objectives described in Sub-element a.

c. Describe the process used to establish operational and strategic quality improvement goals, and how goals and objectives are integrated into organization-wide planning and budgeting process. Describe how these plans are implemented and managed on a routine basis.

d. Describe how employees, customers, and suppliers participate in the planning process.

e. Describe the principal types of data, information and analysis used in planning, such as customer requirements, process capabilities, supplier data, benchmark data.

*f. Describe the principal types of data, information and analysis used in the planning, such as customer requirements, process capabilities, supplier data, benchmark data.*

## 3. Customer Focus (35 points)

This category examines the organization's overall customer service systems, knowledge of internal and external customers, responsiveness and ability to meet requirements and expectations.

a. Describe the methods used to obtain a knowledge of external customer requirements and expectations, how this information is shared with relevant employees and how employees use it.

b. Describe the methods used to identify internal customers, determine their requirements, and how this information is shared with employees, and how employees use it.

c. Describe internal and external customer feedback systems, including procedures for handling customer complaints, and how feedback information is used to improve products and services.

d. Describe the organization's service standards derived from internal and external customer requirements and expectations. Indicate how performance relative to these standards is tracked and used to ensure the customer needs are met.

e. Describe the organization's external customer interface practices (i.e., how customer-contact employees are empowered to resolve problems). Describe any special training for customer-contact employees.

*f. Describe how the organization evaluates and improves the effectiveness of its process for: 1) determining customer requirements and expectations; 2) receiving customer feedback; 3) handling customer complaints; and 4) its customer interface practices.*

## 4. Training (10 points) and Recognition (5 points)

This category examines the organization's efforts to develop the full potential of the workforce for quality improvement, as well as its efforts to use rewards and incentives to recognize individuals.

a. Describe the organization's education and training strategy for quality improvement and how this strategy is integrated with the goals and objectives described in Element 2. Describe approaches used to provide education and training (e.g., just-in-time training, train-the-trainer).

b. Describe how the education and training described in Sub-element a. is based on a systematic needs analysis.

c. Describe the types of training provided for all levels of management in support of quality goals. Provide the number of managers who have received this training since the beginning of TQM implementation and the total number eligible who are eligible.

d. Describe the types of training provided for employees in support of quality goals. Provide the number of employees who have received each type of training since the beginning of TQM implementation and the total number eligible for each.

*e. Describe how the fiscal investment in education and training reflects the policy and priority on quality described in Element 1 and quality plans described in Element 2.*

*f. Describe the organization's indicators of effectiveness of education and training activities and how the indicators are used to improve these activities.*

*g.* Describe how contributions to goals and objectives described in Element 2 are recognized and rewarded. Indicate whether and how team and peer recognition are used.

*h. Describe methods used to develop a reward and recognition system that has value to the workforce. Describe how members of the workforce participate in the development of the system.*

*i.* Provide trend data for the past *three-six* years in employee recognition (i.e., percent of both employees and managers recognized by both individual and team recognition).

## 5. Employee Empowerment and Teamwork (20 points)

This category examines the effectiveness and extent of workforce involvement in TQM, and the approaches used to enhance employee empowerment.

a. Describe the organizational strategy for involving and empowering the entire workforce (including union members) to achieve quality goals and objectives described in Element 2.

b. Describe the specific approaches used to enhance employee empowerment (authority to act).

c. Describe specific means available for members of the workforce (both employees and managers) to become involved in TQM activities, both as individuals and on teams.

d. Provide trend data for the past *three-six* years related to workforce involvement for each type of activity described in Sub-element c. Express individual involvement as a percentage of the total workforce. Provide number of teams operating in each year.

**6. Measurement and Analysis** (15 points)

This category examines the scope, validity, use and management of data and information that underlie the organization's TQM system; how the data are used to support improvement; and the process for developing measures.

a. Describe the process for developing measures. Describe how measures relate to goals and objectives in the strategic plan as described in Element 2.

b. State whether measures relating to goals and objectives in the strategic plan exist; provide most significant measures.

c. Describe the organization's base of data and information used to measure progress toward goals and objectives. Indicate the scope of the data it contains (e.g., relating to customers, suppliers, internal processes, program and administrative areas).

d. Describe the processes and/or technologies the organization uses to ensure that key data are accurate, consistent, valid, timely and available to those who need it.

e. Describe how and by whom data and information are analyzed to support quality improvement (e.g., to identify problems, determine trends, evaluate performance of key processes). Give specific examples.

f. Describe the organization's approach to selecting areas to benchmark and organizations to benchmark against; the types of data collected; ~~and~~ *the ways that comparative data are used for improvement; and improves the scope, sources and uses of benchmark data.*

**7. Quality Assurance** (30 points)

This category examines the systematic approaches used by the organization to design, assess, control and improve processes and inputs to produce quality products and services. Emphasis is on prevention rather than detection.

a. Describe how new or improved products and/or services are designed and introduced to meet or exceed customer requirements (as described in Element 3), and how processes are designed to produce and/or deliver these products and/or services.

b. Describe the principal means used by the organization to: 1) ensure that processes are adequately controlled to meet design plans and customer requirements; 2) identify and solve root causes of specific problems that disrupt processes; and 3) continuously improve processes; *4) verify that improvements will produce desired results; and 5) communicate changes to all relevant work units.*

c. Describe the principal approaches used to assess quality (e.g., systems audits, product or service audits). Include the frequency of such assessments and how the findings are translated into prevention and improvements.

d. Describe how the quality of materials, components, information, and services furnished by external suppliers is assured, assessed and improved. *Indicate whether quality is considered when selecting suppliers.*

## 8. Quality and Productivity Improvement Results (50 points)

This category examines the measurable results of the organization's quality improvement efforts. Data tables and graphs summarizing trends and achievement should be utilized as much as possible.

a. List at least *five* of the most significant indicators of the organization's mission performance as described in Element 6; provide trend data for the past *three-six* years. Explain any adverse trends.

b. Provide trend data for the past *three-six* years indicating the level of external customer satisfaction with the quality of major products and services.

c. Provide trend data for the past *three-six* years for key organizational measures of quality, timeliness, or productivity (other than those listed in Sub-element a.). In addition, provide trend data for the past *three-six* years for in-process (e.g., rework rate) and end-item (e.g., defect rate) measures. For each measure listed, describe actions taken to produce those results.

d. Provide trend data for the *past three-six* years for performance of major external suppliers.

# Appendix H. List of Acronyms

H.1 This list of acronyms covers acronyms used in this thesis. The acronyms are drawn from both TQM literature and military terminology.

| Acronym | Definition |
| --- | --- |
| ADR | Alternate Dispute Resolution |
| AFB | Air Force Base |
| AMC | Army Material Command |
| ANSI | American National Standards Institute |
| AR | Army Regulation |
| ASD | Aeronautical Systems Division |
| ASQC | American Society for Quality Control |
| CECOM | Communications and Electronics Command |
| CII | Construction Industry Institute |
| CMR | Command Management Review |
| CoE | Chief of Engineers |
| CONUS | Continental United States |
| DA | Department of the Army |
| DCMC | Defense Contracts Management Command |
| DoD | Department of Defense |
| DON | Department of the Navy |
| EFD | Engineering Field Division |
| ESC | Executive Steering Committee |
| ESG | Executive Steering Group |
| FQI | Federal Quality Institute |
| ISMP | Information Systems Modernization Program |
| ISO | International Standards Organization |

| Acronym | Definition |
|---------|------------|
| JIS | Japanese Industrial Standards |
| JUSE | Union of Japanese Scientists and Engineers |
| LTG | Lieutenant General |
| NAVAIR | Naval Air Systems Command |
| NAVFAC | Naval Facilities and Engineering Command |
| NPRDC | Naval Personnel Research and Development Center |
| OMB | Office of Management and Budget |
| OSD | Office of Secretary of Defense |
| PAT | Process Action Team |
| PDCA | Plan, Do, Check, and Act |
| PPM | Program and Project Management |
| PWC | Public Works Center |
| QAT | Quality Action Team |
| QC | Quality Control |
| QMB | Quality Management Board |
| QIP | Quality Improvement Prototype |
| QWL | Quality of Work Life |
| SPC | Statistical Process Control |
| SQC | Statistical Quality Control |
| TAQ | Total Army Quality |
| TEQ | Total Engineering Quality |
| TQC | Total Quality Control |
| TQL | Total Quality Leadership |
| TQM | Total Quality Management |
| USACE | United States Army Corps of Engineers |
| ZD | Zero Defect |

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